

FLIGHT

The
AIRCRAFT
ENGINEER
and
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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INDEX AND TITLE PAGE FOR VOL. XII.

The 8-page Index for Vol. XII of "FLIGHT" (January to December, 1920) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1/- per copy, post free.

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

April 12 ...	Willbur Wright Memorial Lecture, by Maj. G. I. Taylor, before R.A.S.
April 13-20	Monaco Seaplane Meeting
April 20-22	Aero Club of France Grand Prix. 3rd stage
May ...	Seaplane Contests on Lake Garda, Italy
June 1 ...	Entries Close for Schneider Cup
June 10 ...	Race, Lugo-Trieste-Triente-Lugo
July 16 ...	Aerial Derby
Sept. 4-11	Brescia Races
Sept. 5 ...	Pulitzer Trophy, Detroit, U.S.A.
Sept. ...	Gordon Bennett Balloon Race
Sept. 30 ...	Provisional Date for Schneider Cup

EDITORIAL COMMENT



THE cynicism with which the spokesmen of the Government treat questions relating to the vital problem of the future of British aviation almost passes comprehension. An incident in the Commons recently is redolent of the state of mind in which the subject is approached by those who, by virtue of their position, should really know better. Sir W. Joynson-Hicks asked whether, seeing that unless civil aviation subsidies were arranged within the next fortnight, it would be almost impossible to start the necessary air services in time for summer flying, these arrangements would be carried out immediately. Capt. Guest, who replied for the Government, said that the Committee appointed to consider the question of civil aviation subsidies had been sitting almost daily. There would, he said, be no avoidable delay in coming to a decision on the subject, as the need for rapid action was fully appreciated. Certain tentative recommendations had already been submitted by cable to the Secretary for Air, but the main difficulty appeared to be the want of public financial support. Mr. Raper asked if it was not a fact that, owing to the lack of support given to aviation, all the Continental air mail services were already in the hands of Continental firms. The only answer vouchsafed to this very pertinent enquiry was that this "did not arise out of the question."

Why does it not arise? Surely that is the gravamen of the whole matter—that owing to the want of policy of the Government British civil aviation has virtually ceased to exist, and the whole business of carrying British air mails to the Continent has fallen into the hands of the foreigner. In our profound ignorance of the rules governing the proceedings of question and answer in Parliament, we should have thought that this most certainly did arise out of the question. The rules in question appear to be made for the express purpose of enabling Ministers to burke the real issues and to conceal the very information which questions are framed to extract and which the public, no less than Parliament itself, had a right to receive.

British Air Services Resumed

It has been officially announced by the Air Ministry that the Committee appointed by the Secretary of State for Air to investigate the question of the cross-Channel air services has now been able to make arrangements for a daily British air service between London and Paris. This service opened last week-end, and is being operated by Messrs. Handley Page and Messrs. Instone. It is understood that the present arrangement is a purely temporary one, which will be effective only until a more permanent scheme can be arrived at for placing the future of these services and of civil aviation in general on a satisfactory basis. In the meantime, these services are to be carried on and the firms concerned guaranteed up to the end of the coming summer, enabling them to run on equal terms with the French companies. The passenger fares have been fixed at six guineas for the single and £12 for the return journey—exactly the same fares as charged by the subsidised French air lines.

This is very satisfactory so far as it goes, and we can only wait now to see what the permanent arrangements forecasted are likely to be. We have not the slightest desire to "crab" the Air Minister, but we should have been much more satisfied if he had taken similar action before his hands were practically forced and before our own British aviation firms had so much leeway to make up. We had services in being, and it would obviously have been much better to have made these arrangements before they were closed down, rather than to have waited until the thing was virtually dead.

However, a start has at last been made to put British aviation on its feet, and we trust that the Government will not look back now that it appears to have come to a somewhat belated conclusion that there is enough in civilian aviation to make it essential that it should be supported through its bad time. It has been long in reaching that state of mind—but, better late than never.

A £1,000,000 Aviation Company

Only a day before the Air Ministry announced that the arrangements had been concluded for reviving the cross-Channel air services, it was stated that a financial group was prepared to find a round million pounds to form a company for operating air services, under a guarantee against loss given by the Government. Almost on the heels of this announcement—which, by the way, elicited a statement from the Air Ministry that nothing was known of such an offer—came another to the effect that the offer had been withdrawn. The facts seem to be that Mr. Holt Thomas made a suggestion on these lines to the Committee which is considering civil aviation, and then set out to endeavour to get the money. The leading banks and others received the proposal very favourably, and, Mr. Holt Thomas says, there was no doubt the scheme could have been carried through. In view of the move by the Government, restarting the Channel services, Mr. Holt Thomas thought it proper to withdraw the offer, as he thought, quite rightly, that it was better to wait in view of the changed circumstances.

There the matter rests for the moment. It would seem that the basic idea of such an arrangement is excellent, provided there was nothing in the shape of Government "control" over the administration of the services which would be established under

such a guaranteed scheme. Of course, the Government would have to exercise some amount of care to see that the guarantee business was not taken undue advantage of, but we should certainly not like to see such an enterprise subjected to the blighting influence of permanent Government administration. However, as the scheme is in abeyance for the time being, it is unprofitable to discuss it further.

Sir F. Sykes on Aviation

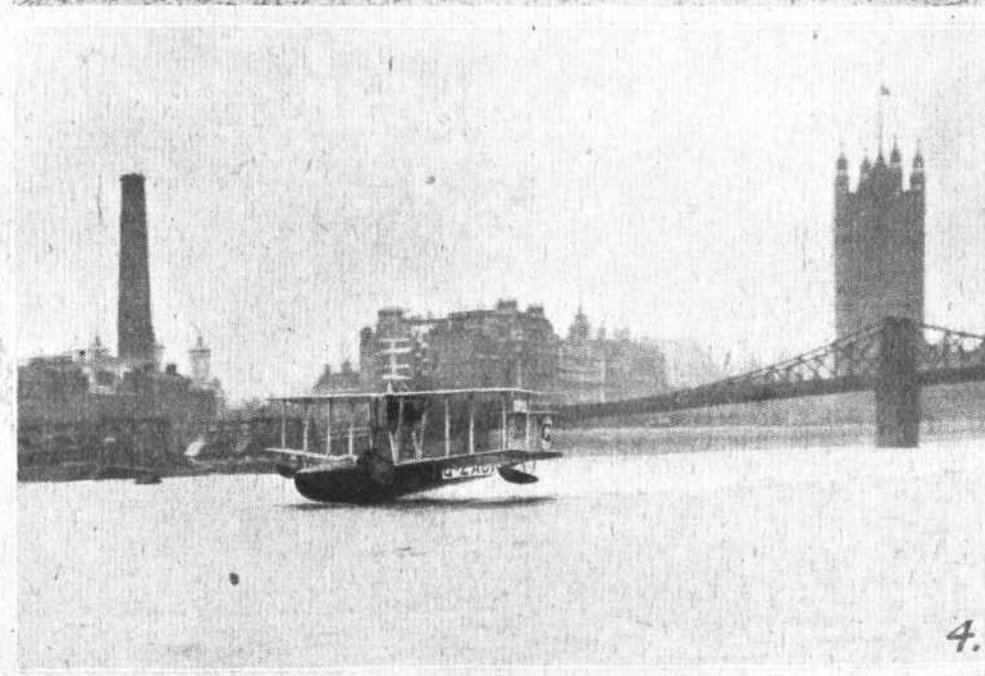
When the Controller of Civil Aviation speaks in public on his own subject, he invariably has a good deal to say that is of interest and value to the movement. His most recent discourse on aviation—a lecture to the members of the Institute of Transport—is not the least interesting of his pronouncements. As a fairly full report of the proceedings appears in this issue of FLIGHT, there is no need to follow him throughout the whole length of his lecture, but there are nevertheless certain outstanding points to which reference may usefully be made.

The first, and in some respects the most immediately important, was his reference to civil flying. There was a school of economic thought, he said, which believed that a commercial enterprise which could not pay its way was *ipso facto* valueless. In so far as aviation was concerned, however, given a reasonable chance it would pay its own way, but the opportunity must be given. The present problem was tiding over the immediate period of experiment, and if that could not be done by private enterprise then it must be done with State assistance. If commercial aviation died, we not only lost a great potential reserve for Service aviation in time of emergency, and thus risked our national security, but we neglected the use of the fastest means of intercommunication yet devised and surrendered commercial air supremacy to those nations which were already fully aware of its importance.

It may be true that this is no more than we ourselves and others have been saying for years, but the importance of such a pronouncement is in the official position held by the Controller-General. In view of the spineless attitude of the Government toward civil aviation and the fact—which we consider now to be fully proven—that the present Secretary for Air has been "nobbled" by the military school of air thought, it requires no small courage on the part of Sir F. Sykes to publicly condemn, even by implication, the present policy of *laissez faire* which characterises the administration of air affairs. We sincerely trust that the words to which we have referred will sink into the minds of those to whom they were obviously addressed more than to the members of the Institute of Transport.

Aviation in War

Still keeping to the subject of the need for developing the civil side of aviation, Sir Frederick went on to examine the methods by which an adequate reserve and capacity for expansion could be maintained. It was obvious, he said, that the capacity of the constructional side of the industry to expand could not be maintained by Service aviation alone. In the event of another great war, which again would be one of attrition, the power of expansion would be more important than any amount of machine reserve power immediately available. The one solution of the problem lay in the development of commercial aviation the vital importance of which



THE THAMES AS AN AIR PORT: Vickers Amphibian "Viking III," 450 h.p. Napier "Lion" engine, continues the tests. 1. The "Viking" on "The Hard" outside Doulton's. Note the barge in the foreground. 2. Going into the water again. Note the wheels are down. 3. Afloat, with the wheels just beginning to rise out of the water. 4. Off. The wheels are now quite clear of the water. (See page 209.)

was that it would keep in existence an aircraft industry with its research, designing, technical, constructional and experimental staffs, capable of quick and wide expansion. The nation which first substituted aircraft for other means of transport would be more than half-way towards the supremacy of the air.

We are, said Sir Frederick, in sight of the economic machine that is wanted, and the question now to be answered is: how to carry on until it can be evolved and produced in sufficient numbers? It can never be evolved unless there is a demand, such as an Air Service provides, and the only method by which commercial aviation can be carried through its experimental stage is by the aid of Government subsidy in some shape or form.

As to aviation in war, the Controller-General appears to think that it will almost completely revolutionise naval warfare. He believes that its potentialities in this direction are even greater than in land war. Incidentally, this opinion is rather flattering to ourselves, since it coincides with that we expressed many years ago and continually since, the last reference being only a week ago when discussing recent experiments made by the United States naval and air authorities. Sir F. Sykes believes that there is every indication that torpedo attack by aircraft will reach a point where the very existence of opposing fleets consisting of the giant capital ships of the present day might be jeopardised. For the cost of one battleship 1,000 torpedo-carrying seaplanes could be built, and it is already questionable if a battleship could survive an attack launched by even a small force of this mobile arm. Another form of air operation may be gas attack, assisted by submarines.

It seems to us that if only a portion of the developments prophesied should eventuate into actuality, war between two Great Powers will become impossible—that is to say, war in the real sense. What it will come down to is that where one party to a dispute feels that the aggressive can be taken with safety, an attack will be launched by combined air and sea forces, and so terrible will be the immediate consequences that the other side will be rendered impotent to reply. If that is so—and we believe it is—the argument obviously is that we, in order to secure ourselves against such a sudden attack, must be in such a position of relative power that no other Power contemplating aggression can be certain that it is strong enough to bring off the stroke. In other words, we come down to the last reduction of the argument that the best manner of ensuring peace is to be prepared for war. To be prepared we must be strong in the air. To be strong

in the air we must see that civilian aviation is given a real opportunity to develop, else we shall encounter the day of wrath without those reserves and that capacity for immediate expansion upon which Sir Frederick Sykes very rightly lays so much stress.

Aviation and the Navy

In introducing the Naval Estimates, Lord Lee of Fareham, the new First Lord of the Admiralty, informed the House that the decision had been taken to abandon altogether the use of lighter-than-air craft for use with the fleets, but that a heavy appropriation was being asked for the increase of the numbers available of seaplanes and amphibians. Not being naval experts, we have a perfectly open mind regarding the substitution of the heavier-than-air types for the airships which rendered good service during the War. It is quite possible that the lessons of the War had led to the legitimate conclusion that the airship is too slow and vulnerable to the attack of aeroplanes to be dependable as the eyes of a fleet. If that is so, the Admiralty is to be applauded for its decision. There would be no sense in pinning our faith to aircraft that fall short in any essential particular of the requirements of naval war. But the experts should make very sure they are right before they continue to maintain their scrapping policy. Without question there can be no sentiment in war, and the true policy is to ruthlessly scrap that which is obsolete.

Before, however, such a policy is finally determined upon it would be interesting to know upon what premises it is based. There are certain directions in which the airship possesses marked advantages over the heavier-than-air machine. It has an enormously greater radius of action, and is, if it may be so put, a very much steadier observation platform. As to its vulnerability to attack by aeroplanes, we do not know exactly to what altitudes the latest British rigids are capable of ascending, but the records attained by certain of the later Zeppelins seem to indicate that they could reach heights which made aeroplane attack, except by individual machines, extremely difficult if not virtually impossible. By the use of helium gas and improved gun armaments, the big airship should not have a great deal to fear from the solitary aeroplane. We agree that these are not the only considerations. The airship of sufficient size to work with the fleet is an exceedingly costly vessel to construct, while the arrangements for housing and mooring are infinitely more costly and complicated than in the case of the heavier-than-air machine. All things considered, including present financial reasons, the decision of the Admiralty may probably be the wiser, even if later it is thought fit to revise this policy.

German Maps of Holland from the Air

VERY suggestive information was published last week in Holland in the *Telegraaf*, showing the anticipatory work by the Germans during the War. This Dutch paper prints a number of reproductions of German bird's-eye maps of Holland taken from the air. The collection comprises a total of 30 maps, headed "Luftorientierungskarten: Holland"; they are marked "secret," and they were printed by the German Admiralty in 1916 and 1917.

The fact that two or three years after the outbreak of the War the Netherlands were still considered as a possible "Angriffsobjekt"—object of attack—for German airmen is not without interest even now, and proves again how thoroughly Germany's activities in neutral countries were carried out. Forts, railway bridges, wireless stations, gasworks—indeed, all places of military and economic importance—are marked on the maps.

The "Roma" Makes a 300-Mile Run.

A SUCCESSFUL non-stop flight from Rome to Naples and back, 300 miles, was made on March 15 by the "Roma," the Italian dirigible acquired by the United States Government. There were 52 persons on board, including Mr. Johnson, the American Ambassador to Italy, with his wife, and a number of American officers. Lunch was served as the craft was passing over the Isle of Capri.

Prague to Hold Second Aero Show

ENCOURAGED by last year's success, Czecho-Slovakia is organising its second Aero Exhibition at Prague from September 25 to October 2.

Ecuador-Colombia Air-Mail

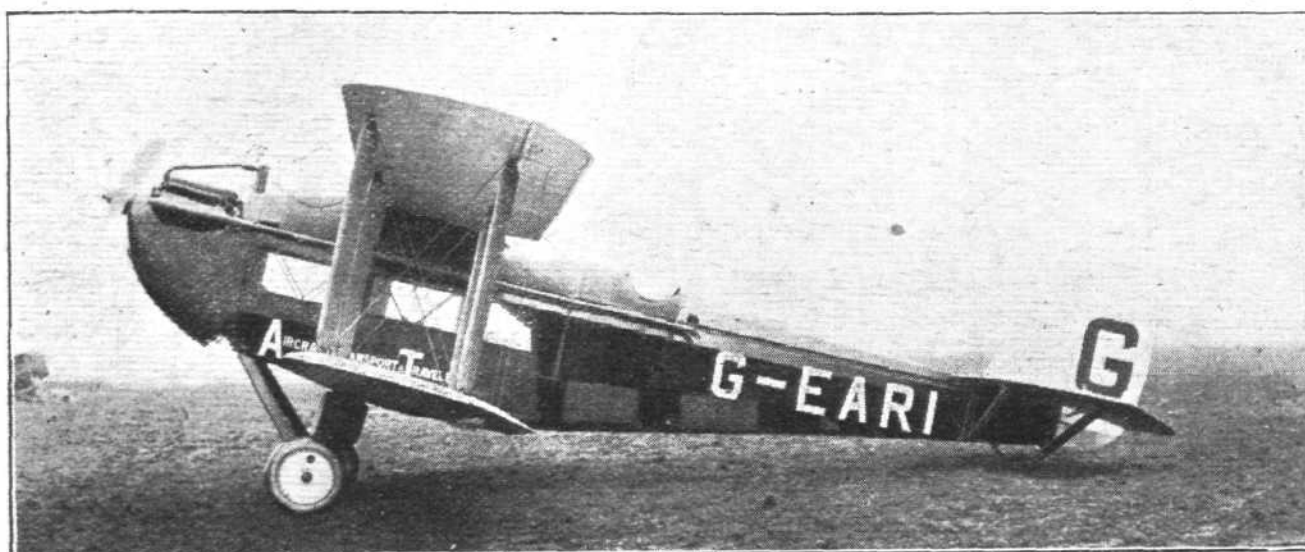
AN "air-mail" has been carried from Carchi in Ecuador to Pasto in Colombia by Signor Guicciardi, an Italian pilot, this being the first mail by 'plane between the two republics.

THE D.H. 18 LIMOUSINE

450 H.P. Napier Lion Engine

IN many respects one of the most remarkable machines designed by Capt. de Havilland, the D.H. 18 Limousine, of which we publish illustrations this week, is the first really commercial aeroplane produced by that famous designer. The majority of the machines in use by Aircraft Transport and Travel on the London-Continent routes, until the unfortunate demise of that firm some months ago, were converted war machines, and although they did excellent work, they could not compare for suitability and economy with the "18," specially designed for the work. Thus it may be remembered that in the paper read by Mr. H. White Smith before the Air Conference at the Guildhall last year, figures

ordinarily good results. These machines were built by the Aircraft Manufacturing Co., before that firm ceased to exist as an aircraft firm, and thus the machine, as a type, is not new. A modernised version is, however, nearing completion at the Stag Lane works of the De Havilland Aircraft Co., Ltd., and it is therefore thought that a few notes dealing with this machine may be of interest. It should be pointed out that the machine now being constructed is similar in all main characteristics to the earlier machines, but minor alterations and improvements which experience has suggested are being incorporated in the latest specimen. The accompanying photographs show one of the earlier models, but the detail



THE D.H. 18 : Side view.

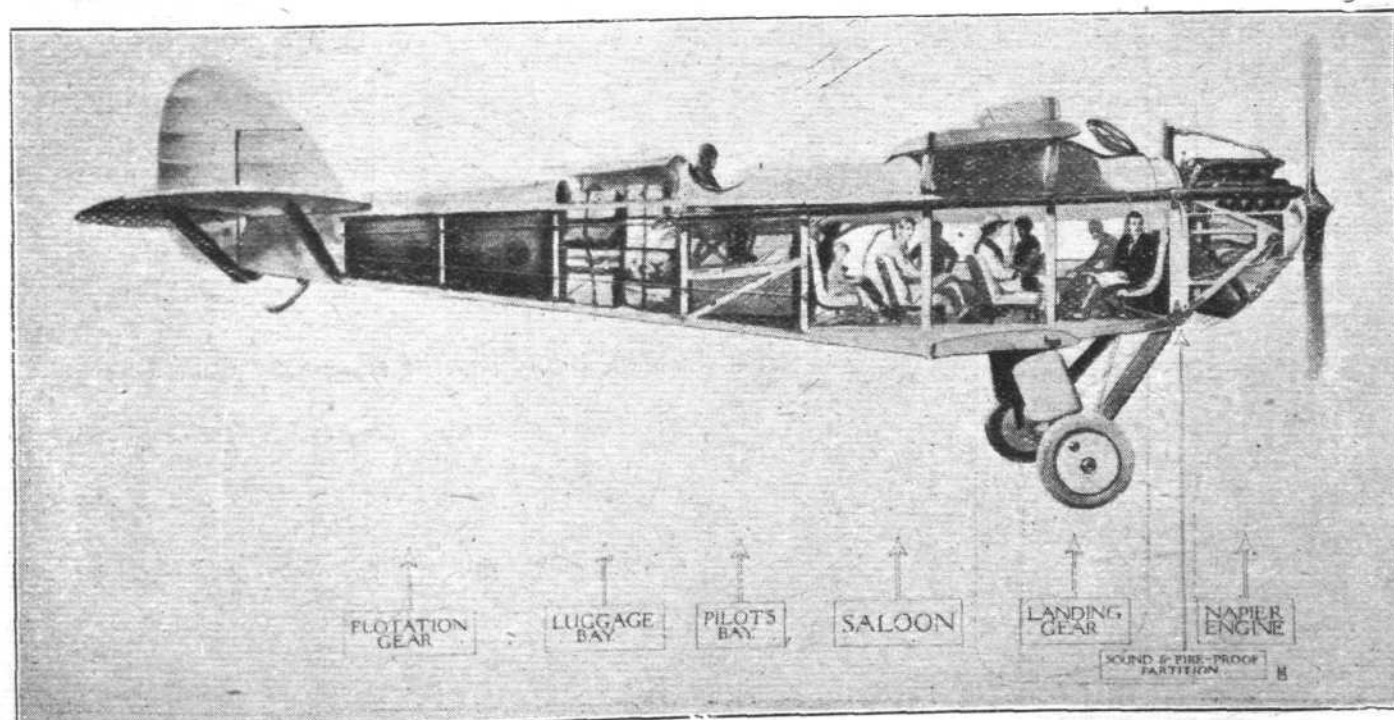
were given of the cost of operating a service with six machines, each flying 1,000 hours per annum, and the honour of showing the lowest figure per passenger mile, per passenger journey of 240 miles, per ton mile, and per ton per journey of 240 miles, fell to the D.H. 18. These figures, it may be remembered, were respectively as follows:—4½d., £7 4s. (on 75 per cent. load factor), 3s. 7d., and £42 18s.

These figures, it should be kept in mind, were not based upon theoretical estimates, but were the result of actual experience in running, the D.H. 18 type having been in use by the A.T. and T. for several months, when it gave extra-

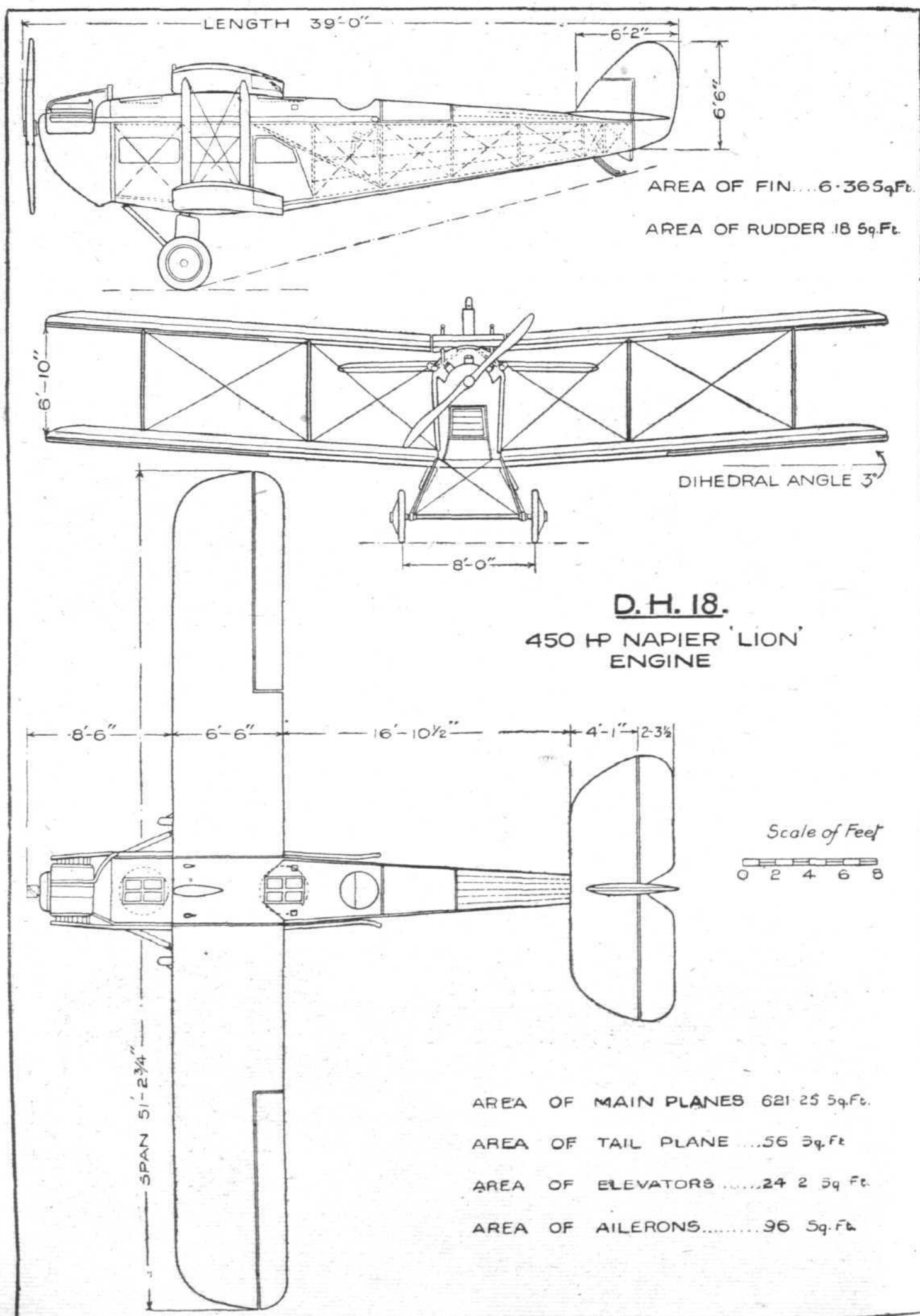
sketches are taken from the latest machine. Reference will be made later to points in which the new machine differs from the earlier ones.

General Arrangement

Briefly, the D.H. 18 is a vertical biplane, of the tractor type, with the passengers accommodated in an enclosed cabin approximately level with the wings, and the pilot seated well aft, about half-way between the nose and tail of the body. The engine is mounted in the nose, rather higher than is usual practice, giving a high centre of thrust, and, incidentally, ample ground clearance. As the accompanying



Pictorial diagram of passenger accommodation, etc., in the D.H. 18.



THE DE HAVILLAND 18 COMMERCIAL MACHINE : Plan, side and front elevations, to scale.

illustrations will show, the machine is of very clean design, and the performance, as indicated by the figures at the end of these notes, is uncommonly good, the maximum speed being as high as 128 m.p.h., and the cruising speed in the neighbourhood of 100 m.p.h.

The Fuselage

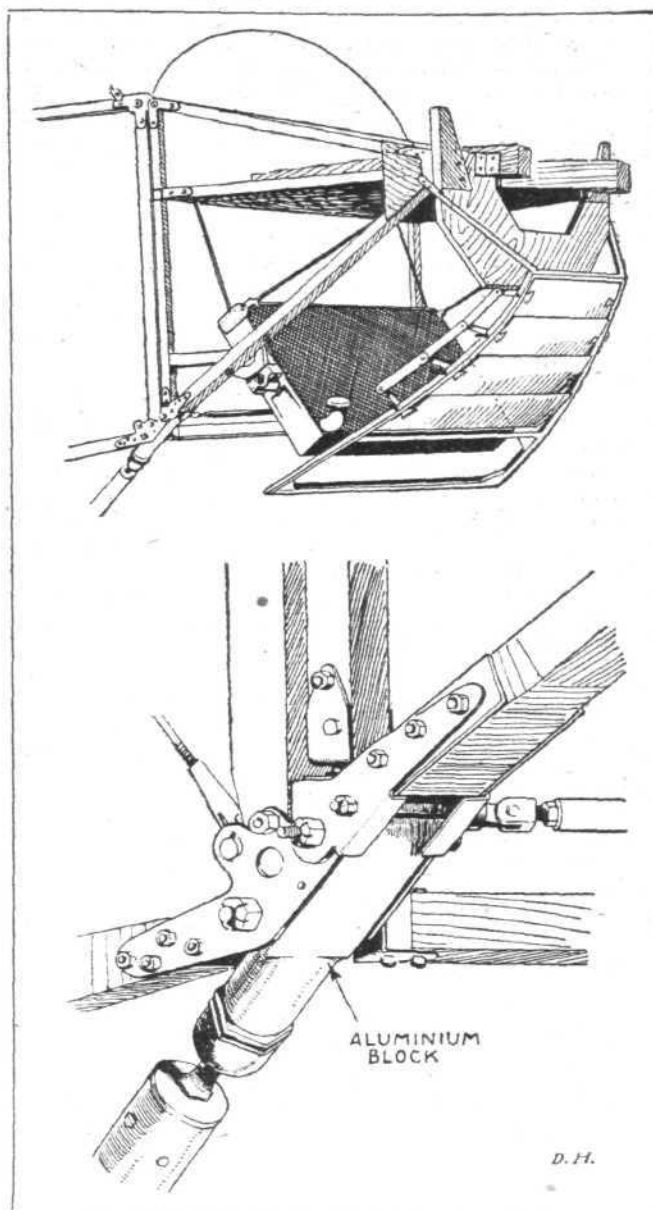
As regards the rear portion of the fuselage, standard De Havilland construction is employed, i.e., the body is a girder structure in which the struts are secured to the longerons by sockets having bolts passing through the longerons, the vertical and transverse struts being slightly staggered in relation to one another so as to allow clearance for the bolts. Wire bracing of the usual type is employed. The walls of the cabin are of slightly modified construction, three-ply wood being used as a covering material in such a manner that the cabin is watertight when the door is locked. This should ensure that, in case of a forced descent on the sea, the machine will remain afloat for a considerable period, at any rate sufficiently long to give a very good opportunity of saving the occupants. In order to increase further the chances of remaining afloat, a large air bag is fitted in the rear portion of the body, aft of the pilot's seat.

The Passenger Accommodation

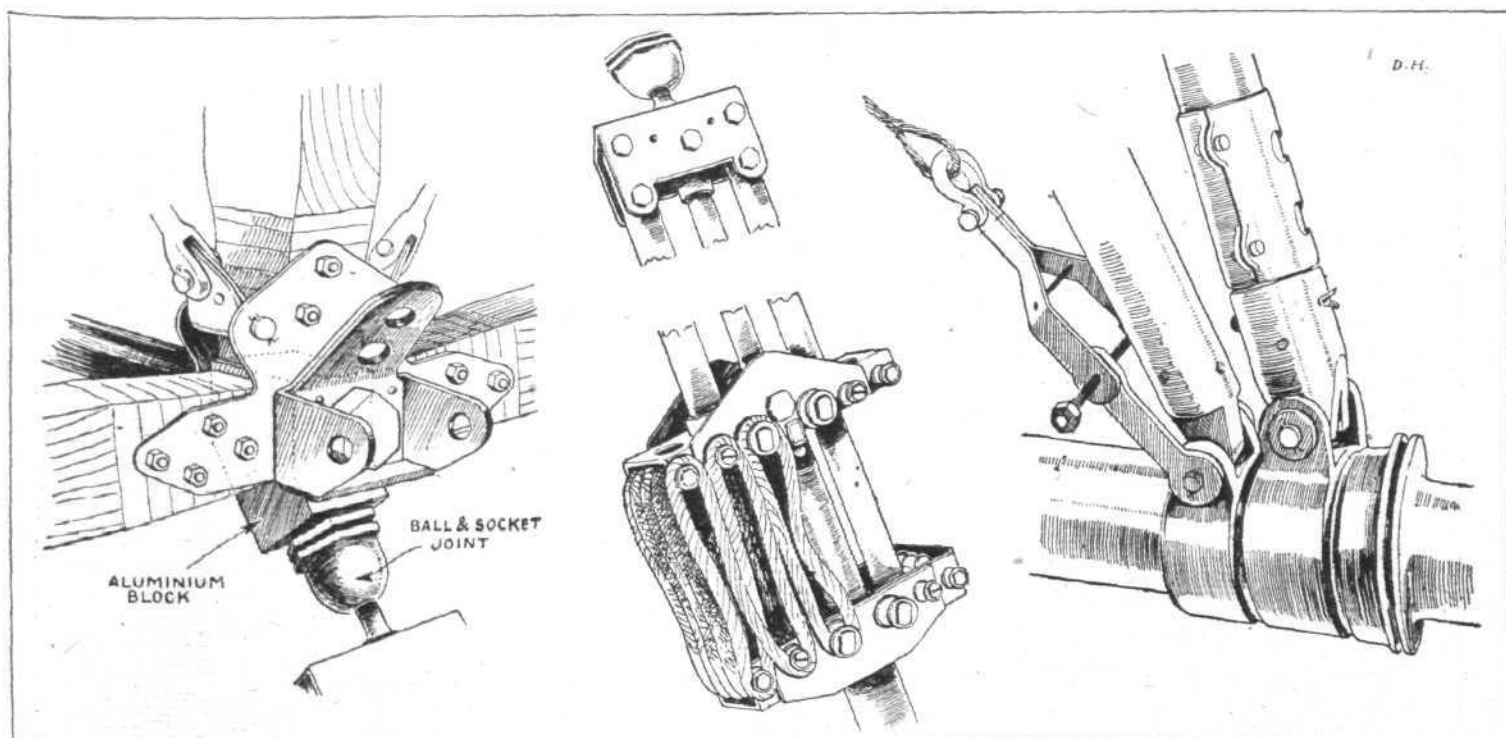
One of our photographs shows the cabin, which is very comfortably arranged. Some of the seats, it will be seen, face forward, while others face the opposite way. The seats shown are those of an older model. Those of the machine now being built will be of the wicker work variety, and will, although quite as comfortable, be considerably lighter. The general scheme of the cabin will, however, be practically unaltered. The passengers, of whom eight can be accommodated, gain access to the cabin through a door in the port side, and windows are provided in both walls, so that, apart from the obstruction offered by the lower main plane, the view obtained is quite good. In addition to the side windows, skylights are provided over front and rear portion of the cabin. These skylights, incidentally, form part of the curved roof of the fuselage, and under each, cut in the flat ceiling of the cabin, is a circular opening through which, and through the skylights, the passengers could, if necessary, effect their escape should the side door be out of order, after a bad landing, for instance. The value of these emergency exits as a means of escape in case of necessity should be especially appreciated by nervous passengers, and such exits ought, in fact, to be compulsory on all passenger aircraft. Aft of the cabin, and more or less underneath the pilot's cockpit, is a space for luggage, of which a fair amount can be carried.

The Pilot's Cockpit

Except for its somewhat unusual situation far aft in the fuselage, the pilot's cockpit does not call for any particular comment. The usual controls, instruments, etc., are provided, and the only innovation appears to be the addition



THE D.H. 18 : The engine unit is detached by undoing a few bolts in the four corners. The lower sketch shows the fitting in the lower starboard corner.



THE D.H. 18 : From left to right the sketches show : Ball-and-socket joint attachment of telescopic undercarriage strut to lower longeron. Detail of the rubber shock-absorber arrangement. Attachment of struts to wheel axle.

of a transverse shaft a short distance forward of the tail plane, carrying cranks for the elevator cables. By this means it is hoped to do away with the constant deterioration of elevator cables which nearly always attends the use of fair leads where the course of a cable is changed. It has been found that the grease put into these tubular guides forms, in conjunction with the sand and grit blown into them by the propeller slip stream, an excellent grinding compound, guaranteed to ruin any cable in a very short time. The new arrangement (which is not shown on our general arrangement drawings) is expected to make the life of the control cables infinitely longer and much more worth living. Seriously, this question of control cables is one of much greater importance in the practical running of an air service than one would be inclined to expect, and we are glad to see attention being given to this point in the latest design.

The Engine Installation

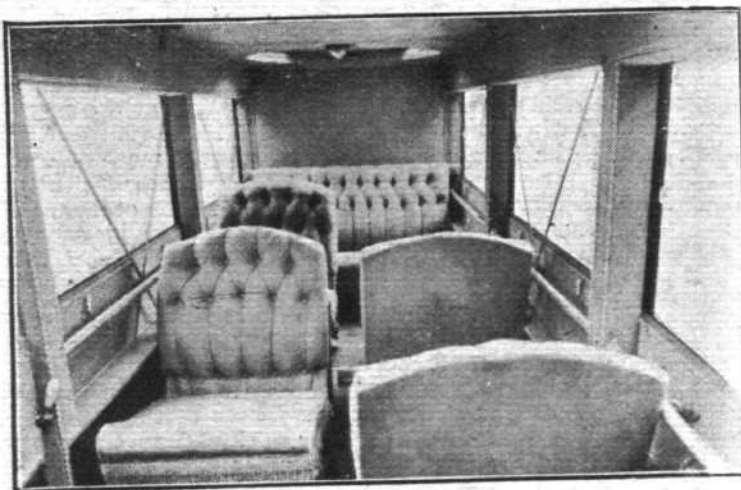
Another feature of this design, in which Capt. de Havilland has shown that he appreciates the need for designing for commercial conditions, is the manner in which the engine and its mounting and housing are arranged to be detached as a complete and separate unit. One of the accompanying sketches shows the engine bearers and their supports, while underneath is indicated the way in which the engine unit is attached to the main fuselage. By simply undoing four bolts, one at each corner, and disconnecting the petrol pipes, etc., the entire engine unit can be removed for overhaul in the shops, and another unit substituted, so that the machine need not be idle while its engine is being overhauled. This advantage of unit construction is one to which we have drawn attention repeatedly, and it might with advantage be extended to include other parts of machines.

The radiator is mounted below the engine, and is rigidly fixed, the amount of cooling being regulated by slats as indicated in the sketch. The main petrol tanks, carrying slightly over 100 gallons, are mounted in the deck fairing above the cabin. The service tank is in the top centre section.

The Undercarriage

Two things mark the undercarriage of the D.H. 18 as distinct from the majority of machines. One is its unusual height, and the other is the manner of springing the wheels. The height adopted is such that it allows of the main planes being at an angle of about 16° when the tail skid is on the ground. The result of this is that the machine pulls up very quickly, which is of great advantage for emergency landings on small aerodromes. The manner of springing the wheels is unusual in that, although rubber shock-absorbers are used, the undercarriage is not of the ordinary Vee type. The wheel axle runs right across from side to side, and is secured at each end to an upright tube carrying a Tee piece. From the lower longerons of the fuselage two tubes run down to another Tee piece below the first one. Rubber chord is attached to these Tee pieces and provides the springing. To prevent the machine from bouncing on landing an oleo gear is incorporated, the plunger rod of which can be seen

in our sketch between the two upper tubes. The members corresponding to the front legs of the ordinary Vee undercarriage are in reality radius rods, and as the wheels move independently, and travel back as well as upward, the effect of this movement sometimes looks rather extraordinary when the machine is landing. The oleo damper piston effectively prevents bouncing, and the machine appears to "waddle" on rough ground. As the travel of the wheels is considerable (about 10 inches), the passengers feel very little shock on alighting, and in practice the undercarriage has given very good results. Some of the details have now



View inside the cabin of the D.H. 18.

been redesigned and look a good deal neater. These will be incorporated in later machines.

Specification

The main data relating to the D.H. 18 are as follows:—Span, 51 ft. 3 ins., length o.a. 39 ft., height 13 ft., chord, 6 ft. 6 ins. Gap 6 ft. 10 ins., area 620 sq. ft., weight empty with water 4,040 lbs., pilot 180 lbs. Petrol 761 lbs., oil 95 lbs., useful load 1,440 lbs., total weight fully loaded 6,516 lbs., load per sq. ft. 10.5 lbs., load per h.p. 12.3 lbs., maximum speed at 1,000 ft. 128 m.p.h., at 5,000 ft. 125 m.p.h., climb to 10,000 ft. 20 minutes, ceiling 16,000 ft., range at 5,000 ft. and full speed 400 miles. These figures apply to the machine as fitted up for carrying eight passengers. If desired the seats can be removed and the cabin used for cargo space. The cubic capacity of the cabin is then 256 cu. ft., and by loading the machine up to a total weight of 7,116 lbs. the useful load that can be carried is 2,200 lbs. The extra load has but small effect on the performance, reducing the maximum speed to about 124 m.p.h. and the ceiling to 15,000 ft. The landing speed is, of course, also slightly increased by the extra loading.

U.S. Air Pilots to Bomb Moving Ship

BRIG.-GEN. MITCHELL is a great advocate of the aeroplane as opposed to the battleship. Last week we published a diagram of the effects of air-bombing upon a stationary target. From America it is now stated that these experiments are to be repeated, but, in this case, upon, amongst others, the former German battleship "Ostfriesland" as a first target. The vessels are to be bombed by both army and navy flyers, about 150 miles out at sea, and later it is proposed to put the obsolete battleship "Iowa" and others through the same ordeal whilst at speed at sea. This should help to get a better idea of aircraft v. battleship.

Leeds Flies to Athens

WHERE a week can be saved under urgent necessity is demonstrated this week in the hustle of Mr. William Leeds, the son of Princess Anastasia of Greece, who was called from America to the sick bed of his mother, formerly Mrs. Leeds, at Athens. He was, immediately upon the arrival of the liner "Imperator" at Cherbourg on Sunday last, to have taken car to Caen and thence to have flown in a 2-seater D.H.9, piloted by Mr. H. H. Perry, wireless for the previous day to the Handley Page Co. to be in waiting at Caen. French restrictions, however, prevented this, and Mr. Leeds had to proceed to Le Bourget, whence he was due away on Monday morning, hoping to reach his destination, Athens, on Wednesday afternoon. The only alternative route would have been from Cherbourg by train and steamer, necessitating eight days' journey.

Fired by the good example of Mr. Leeds, several of his

compatriots who also arrived in the "Imperator" are said to have decided to travel as far as Brindisi in like manner, ten additional machines being radioed for to be in readiness at Paris. Like a good many other good intentions, under present conditions, this latter scheme was rather too tall an order to carry through, with the result that after all Mr. Leeds had to carry on with his fleet of one.

A year or so hence, there should hardly be the necessity even to radio for the machines. They will just be "there on the rank," like unto taxis—or even more so, judging by experiences of recent years.

The Navy Outclasses R.A.F.

WEDNESDAY last week at Association Football the R.N. at Uxbridge beat R.A.F. by one goal to none. The weather was rough as well as the ground, and both seemed to suit the tactics of the naval team better than the airmen. A good shot by Sergeant Wood secured the Navy goal. The teams were:—

Royal Air Force.—Flying Officer A. W. C. Bayes, goal; Corpl. A. H. Nicholls and Sergt. Fretwell, backs; Sergt. R. Goffin, Flying Officer C. N. C. Dickson (captain), and Air Craftsman A. Shand, half-backs; Corpl. R. P. Wash, Air Craftsman G. Ayres, Flight-Lieut. L. H. Pakenham-Walsh, Sergt. T. H. Donald, and Air Craftsman L. Barry, forwards.

Royal Navy.—Shipwright Read, goal; Private Revill (R.M.L.I.) and Leading Stoker Edwards, backs; Stoker Hayes, Able Seaman Stubbs, and Able Seaman Cook, half-backs; Sergt. Wood (R.M.L.I.), Corpl. Warwick (R.M.L.I.), Pay Sub-Lieut. Yates, Shipwright J. Quinn, and E. A. Crossman, forwards.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

ANNUAL GENERAL MEETING

THE Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Wednesday, March 30, 1921, at 3, Clifford Street, New Bond Street, London, W. 1, at 6 p.m.

Committee.—The following Members have been nominated for election to the Committee:—

Lieut.-Col. John D. Dunville.
Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.
Lieut.-Col. F. K. McClean.
D. C. MacLachlan.
Air-Commodore E. M. Maitland, C.M.G., D.S.O., R.A.F.
Flight Lieut. D. G. Murray.
Viscount Northcliffe.
Lieut.-Col. Alec Ogilvie.
F. Handley Page.
Rear-Admiral Sir Godfrey M. Paine, K.C.B., M.V.O.
T. O. M. Sopwith.
Viscount Tiverton.

Great Britain to Australia Flight

It has been decided to present the Gold Medals of the Club to Sir Ross Smith and Sir Keith Smith at the Annual General Meeting of the Club on Wednesday, March 30, 1921, at 6 p.m.

FLYING SERVICES FUND COMMITTEE

A Meeting of the Flying Services Fund Committee was held on Thursday last, March 17, 1921, when there were present:—Squadron-Leader T. O'B. Hubbard, M.C., R.A.F., in the Chair, Mr. Chester Fox and the Secretary.

Applications for Assistance.—Thirty-eight applications for assistance were considered, and Grants and Allowances were voted amounting to £440.

JACQUES SCHNEIDER CUP

Special Regulations for 1921

Translated from the French

1. Clubs entering machines must deposit, in addition to the entry fee laid down in the General Regulations, a sum of 5,000 francs for each machine, as a guarantee of its being present for the Contest.

This sum will be returned in respect of each machine that is present.

Water-tightness and Navigability Tests

2. **Water-tightness Test.**—The Contest will begin with a test of the water-tightness of the floats, which will precede the Navigability Test.

For this test, the machines must be afloat for six hours, and during this time the floats must remain water-tight.

The machines must be in flying order, with or without the crew, and ready to start.

3. **Navigability Test.**—The Navigability Test will follow the Water-tightness Test. It will take place for all competitors on the same day or during the two days preceding the Contest for the Cup, in the order drawn by lot.

The Commissaires Sportifs may allow competitors who have not passed the Navigability Test to make a second and final attempt immediately.

4. Each machine, in flying order, will cover in a closed circuit over the sea a distance of 5 to 10 sea miles. The exact distance will be fixed by the Commissaires Sportifs.

5. After taxiing over the starting line, the machine must rise and continue the course in flight; during this flight

the machine must be taxiing over two distances of $\frac{1}{2}$ mile, the limits of which will be indicated by two buoys; it must then rise and complete the circuit, alighting again before the starting line, and taxiing over.

Machines taking part in the Speed Contest must be in the same condition as for the Navigability Test.

Machines must not undergo any modification between the Navigability Test and the completion of the Contest. Machines will be stamped to ensure this.

In the event of damage during the latter test, the necessary repairs may be carried out at sea, but these must not alter the original condition in which the machine was presented.

Speed Test

The Jacques Schneider Cup in 1921 will be contested over a distance of 200 sea miles.

The Contest will take place between June 15 and September 30.

The order of starting will be drawn by lot.

Starts will be made at intervals fixed by the Commissaires.

The Contest will take place over the sea in a closed circuit of at least 5 sea miles.

The course may if necessary be taken over the coast, the controls being on land, care being taken to avoid all arrangements likely to impede the competitors.

Alightings are allowed. The start and finish will be in flight.

The Contest will close at the time fixed by the Commissaires Sportifs.

The Contest will take place at Venice on July 31, 1921. Entries should be made to the Royal Aero Club not later than May 15, 1921. Entrance Fee, £10.

THE FLYING SERVICES FUND

(Registered under the War Charities Act, 1916)

Administered by the Royal Aero Club

For the benefit of *Officers, Non-Commissioned Officers and Men* of the ROYAL AIR FORCE who are incapacitated while on duty, and for the widows and dependants of those who are killed or die from injuries or illness contracted while on duty.

Honorary Treasurer:

The Right Hon. LORD KINNAIRD.

Committee:

H.R.H. THE DUKE OF YORK, K.G. (*Chairman*).

Lieut.-Col. A. DORE, D.S.O.

Mr. CHESTER FOX.

Squad.-Leader T. O'B. HUBBARD, M.C., R.A.F.

Group-Capt. C. R. SAMSON, C.M.G., D.S.O., R.A.F.

Secretary:

H. E. PERRIN.

Bankers:

Messrs. BARCLAYS BANK, LTD., 4, Pall Mall East,
London, S.W. 1.

Subscriptions

	£	s.	d.
Total Subscriptions received to February 21,			
1921	17,205	3	1
S. Brogdale	2	0	0
Total, March 21, 1921	17,207	3	1

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

Munificent Gift to the Royal Air Force Memorial Fund

THE Crown Leases of "Woodcote" and "Heath End"—two fine houses at Ascot, which were placed at the disposal of the Government during the War by the owner, Mrs. Salting, and which were occupied by officers and men of the R.A.F., and the W.R.A.F.s—have been handed over to the Air Council, so that the houses might be sold for the benefit of the R.A.F. Memorial Fund in recognition of the great work of the R.A.F. during the War. The amount realised is to be ear-marked more particularly to found scholarships or bursaries for the education of the children of Officers who died while serving with the R.A.F. during the War. The houses are very delightful properties, each standing in grounds of 4 or 5 acres, directly

overlooking the racecourse and common, and it is now announced that they are to be sold by auction at the St. James' Estate Rooms on April 19 next. Messrs. Hampton and Sons, of 20, St. James' Square, the auctioneers who are acting in the disposal, inform us that the gift is obviously one of the value of several thousands of pounds, the houses being two of the best moderate-sized places in the district. Both of them are in excellent repair, and will be offered with vacant possession on completion.

It is greatly to be hoped that the sale will be well attended, and that the bidding will be brisk, in order that the R.A.F. Memorial Fund may benefit to the full by Mrs. Salting's munificence.

AVIATION AND AIR TRANSPORT

By Maj.-Gen. Sir F. H. SYKES, G.B.E., K.C.B., C.M.G., Controller-General of Civil Aviation

A PAPER under above title was read by Sir Frederick Sykes before the Institute of Transport, at the hall of the Institution of Civil Engineers, on March 14, 1921. Sir Frederick, to a great extent, covered the same ground as on previous occasions, dealing with the reasons for supporting civil aviation, and pointing out its value to national security. In referring to the question of aircraft operating with the navy, he expressed the opinion that there is every indication that torpedo attack by aircraft may reach a point where the very existence of opposing fleets, consisting of the giant capital ships of the present day, may be jeopardised. For the cost of one battleship, he stated, a thousand torpedo-carrying seaplanes could be built, and it is already questionable whether a battleship could survive an attack launched by even a small force of this mobile arm. Sir Frederick pointed out the modern tendency in war towards the "Nation in Arms," and said that, whereas in 1914 it was some twenty days between the declaration of war and the exchange of the first shot, in the next war, aircraft will be ready for action before the signature of the declaration of war is dry.

On the question of ensuring an adequate aerial reserve and maintaining our capacity for expansion to meet emergencies, Sir Frederick stated that it was his firm belief that the solution of this problem lies in the development of civil aviation. The vital importance of commercial aviation, he said, is that it will keep in existence an aircraft industry, with its research, designing, technical, constructional and experimental staffs, capable of quick and wide expansion

in emergency. There is one way, he said, and one way only, of sustaining commercial aviation through the experimental period, and that is some form of State subsidy.

As to the ways and means to be adopted, Sir Frederick mentioned that it has been suggested that the Air Ministry should expend a certain sum on the purchase of a number of up-to-date machines, which should be let out to one or more approved transport companies. This has the disadvantages attending Government ownership, and prevents the purchase of machines by companies which, from operational experience, are in a better position to select the most suitable types.

"A second, and more likely scheme," the lecturer said, "is the formation of a National Air Transport Company guaranteed against loss by the State, which should, in turn, receive a fixed proportion of the profits, as soon as profit is shown. Such a company should be kept entirely distinct from any constructional company, so that it could place its orders for machines where it wished, thus encouraging healthy competition in design and construction. It would probably have temporarily to hold a monopoly, since otherwise the small sum at our disposal would be frittered away among a number of companies none of which, at the present stage, would command sufficient traffic to pay. The details of the scheme and the method of allocating the subsidy have not yet been worked out, but I am confident a company of this character, free from the control of vested interests and placed on a sound State-assisted financial basis, will be able to pull through the experimental period of Civil Aviation."

RESUMPTION OF LONDON-PARIS AIR SERVICE

As a first result of the Committee of three and its consultations with representatives of the aircraft industry and transport firms, a temporary resumption of the British air services to the Continent was made on Saturday last, when Messrs. Handley Page and, on Monday, Messrs. Instone Air Line recommenced operations.

On the Monday, Lord Londonderry, with several Air Ministry officials, visited the London Terminal Aerodrome at Croydon to witness the re-starting at 12.30 p.m. of Messrs. Instone's Vicker-Vimy-Rolls' plane (the "City of London") for Paris.

Capt. F. L. Barnard, who was the pilot on this occasion, brought his total of cross-Channel "flips" to 352 with this trip. In addition to passengers—one of whom was Mrs. Barnard—the "City of London" carried mails.

In conversation afterwards to members of the Press, Lord Londonderry said: "I hope this inaugurates a new era in civil aviation and that Great Britain will take a leading and foremost place in it. I trust this will be the beginning of services that will radiate from this country through Europe and to the British Dominions overseas."

The Handley Page machine, which left Cricklewood aerodrome on Saturday for Paris, returned on Monday to London with seven passengers and luggage.

No British Air Service has been running, it will be remembered, since the end of February, when Messrs. Handley Page had to close down their services, owing to the "cut" in fares due to the French Government subsidy to French services, which resulted in a reduction of fares to six guineas. The machines to be used for a start will be Vickers Vimy-Commercials (Rolls-Royce engines), Handley Pages (Rolls-Royce engines), and D.H. 18's (Napier Lion

engines). The latter type of machine is fully described elsewhere in this issue. On figures given by Mr. H. White Smith at the Air Conference at the Guildhall last year this machine, it may be remembered, proved the most economical to run on a service like the London-Paris. We understand that the Air Ministry have purchased two of these machines from the liquidators of Aircraft Transport and Travel, and a third, which is now nearing completion (and which has formed the subject of our descriptive article in this issue) at the Stag Lane works of the de Havilland Aircraft Co. at Edgware, from that firm. These machines, it is understood, will be hired out to firms which will run them on the Continental Service.

The new fares on the resumed British services will be as follows: London-Paris, single fare, £6 6s.; return, £12; goods, 1s. per lb. up to 100 lbs., 10d. per lb. for each lb. over 100 lbs. The air mails, which were temporarily surrendered to the French services, will be returned to the British services, and we understand that Messrs. Handley Page and Messrs. the Instone Air Line will carry the mails alternately.

The arrangement just outlined is only a temporary one, subject to the establishment of a more permanent scheme. In the meantime it is very gratifying to know that British firms are not to be allowed to die owing to lack of Government support. What the final arrangements will be is at present impossible to say, as no definite scheme has yet been found which entirely satisfies both the Air Ministry and the firms of constructors and operational companies involved. It is hoped, however, that a scheme which is satisfactory to all will quickly be found.

U.S. Air Mail Service Accidents

IN a summary of fatal accidents which have happened in connection with the U.S. air-mail service since May, 1918, given recently in the *New York Herald*, it is gratifying to British design and construction to note that, as a result of three accidents attributed to defective aircraft, the type of machine known as the German Junker was discontinued in the service. There were eight of these machines originally; four of them were destroyed, three with accidents causing seven deaths. The other machines, 90 per cent. of which are of the D.H. 4 type, have not been blamed for any of the accidents.

Of 19 crashes, two were due to test flights by airmen qualifying for the service, six to miscalculation on the part of the pilots, three to misjudgment of the pilot following failure of the engine, five to weather conditions, and the

three referred to above to defective petrol and engine connections. The five accidents attributed to weather conditions could, it is said, have been avoided. It was the rashness of the pilots in continuing flight in impossible conditions which brought about their death.

Some Jump

SERGEANT EASEL CHAMBERS, 135th Aero Squadron (U.S.), is reported to have made a parachute jump of 22,000 ft. from an airship piloted by Lieut. Wagner during an aerial circus at Post Field.

Casale After Records

LONDON-PARIS and vice versa is sure to be a route over which record times will be sought. Casale, who had already put up a 2-hours' time from Paris and 2 h. 10 m. on the return journey, is stated last week to have arrived at Waddon 1 h. 45 m. after leaving Bourget.



THE THAMES AS AN AIR PORT

Vickers "Viking" Continues Tests

ON Thursday of last week (March 17) the Vickers "Viking," piloted by Capt. Cockerell and carrying Capt. Broome and another passenger, continued the series of tests of the possibility of using the Thames as an air port. If this should prove possible—and in clear weather at any rate there does not appear to be any reason why it should not be quite feasible—it would mean that seaplanes or amphibians could be used for some of the continental services, avoiding the delay of getting passengers and goods to and from an aerodrome situated, as it necessarily must be, some distance outside the city. This is not the only advantage of using amphibians. The journey to such places as Amsterdam, Brussels and Paris would be shortened by a considerable amount if a direct route could be flown, which should be possible to a craft that can alight on either land or sea.

A few minutes before 3 p.m. the "Viking" hove in sight, and soon the roar of the Napier "Lion" could be heard above the rumble of the traffic. Circling around once or twice to lose height, Capt. Cockerell came in over Westminster Bridge, making a perfect "landing" about half-way between that and Lambeth Bridge, taxiing under the latter and climbing on to "The Hard" by Doulton's, just above Lambeth Bridge. The machine looked for all the world like a duck coming out of a pond, and it was most amusing to see her roll on to dry ground. Within a few moments a crowd had gathered around the machine, among which were noticed representatives from Messrs. Vickers, Ltd., from the Air Ministry, and, last but by no means least, an official from the Port of London authorities, who got out his note-book and promptly obtained the name of

the pilot, the identity of the machine, the address of the owners, etc., just as if the "Viking" had been a vessel arriving from parts unknown. It afforded one quite a little glimpse into the future, when one hopes to see machines so arrive many times daily. After a chat and a smoke the crew climbed aboard, the engine was started, and, on her wheels, the machine crossed the short stretch of "hard" and flopped into the water, where soon she was afloat and the wheels raised. Taxiing down towards Lambeth Bridge, where the machine was swung around facing the south-westerly wind, the engine was opened up with a roar, and after a surprisingly short run the "Viking" got on to her step and left the water at the steep climbing angle for which, among flying boats, she is famous. Soon she was lost to view in the direction of Putney Bridge, returning to her "base" at Brooklands.

Exasperating as is the tortuous course of the Thames for many reasons, with regard to the use of it as a port for seaplanes the bends in the river are a blessing. Within a very short space it is possible to find a stretch along which the wind is blowing, so that it should never be necessary to have to alight across the river, no matter what is the direction of the wind. That is, of course, when the Port of London Authorities have been convinced that it is safe to let a seaplane alight anywhere between the bridges, where there is room to do so. The rest of the journey would then be accomplished taxiing. Modern seaplanes are under such excellent control when on the water that even zig-zagging in and out among barges and other river craft presents little difficulty—so long as the engine keeps going.

A SUPERMARINE IN A GALE

Fine Test of Seaworthiness

ON several occasions, reference has been made in our columns to the good sea and air worthiness of the Supermarine flying boats. Fitted with engines of comparatively low power (as compared with the majority of modern machines), they carry quite a heavy power loading, and yet they somehow manage to get "unstuck" without needing an unduly long run. For this, no doubt, the design of the hull is mainly responsible, and in this connection it should be kept in mind that the performance is certainly not obtained at the sacrifice of strength. It will probably still be remembered that on several occasions Supermarine boats have been deliberately stalled from heights of about 30 feet and have survived the ordeal, without any sign of a leak, owing to their resilient construction.

Recently one of these machines had occasion to give a splendid demonstration of her qualities in a wind amounting to a gale. On Monday, March 14, the Supermarine Aviation Works had arranged to demonstrate one of their Supermarine Mark 2 "Puma" Channel Type boats before representatives of a foreign Government. On that day, it may be remembered, there was quite a gale blowing, and even in the comparatively sheltered water above the floating bridge of the river Itchen a considerable sea was running. It had been arranged to demonstrate the boat on that day, and demonstrated it consequently was, with a vengeance. In spite of the wind, the boat was quickly launched, and with two passengers, in addition to the pilot—the passengers being the Naval

Attaché and the head of the Naval Air Service of the foreign Government in question—the machine got off about five seconds after opening up the engine.

A trip was then made down Southampton Water to Isle of Wight, where the machine cruised about for some time, later returning to Southampton and alighting in the outside of Southampton Water. Now commenced the most difficult part of the demonstration, that of taxiing. The wind was blowing about 50 miles per hour, and a strong tide was running. The machine was taxied for about a mile and a half, with the wind, across wind and diagonally, acquitting herself extraordinarily well of her difficult task. Arriving at her slipway the boat was hove out of the water and safely ashore in 14½ minutes, the wind being abeam of her during this operation. The amount of water taken aboard was about 28 lbs., which is extraordinarily little, considering that she had been taxied altogether about 2½ miles in a head, beam and following sea, in a full gale of wind. In view of the fact that the engine is of 230 h.p. only, and that the machine carried two passengers in addition to the pilot, the performance is a very fine one indeed, and appears to prove that the economy resulting from carrying a heavy load per horse power need not entail sacrificing performance. This is most encouraging to those who maintain that if aviation is to be a commercial proposition, we have to carry much greater weight per horse power than was feasible with war machines.

Hendon and Cowes to have Meetings

HENDON, as before, is again to be the centre for the Aerial Derby this year, the date being fixed for July 21. Other Royal Aero Club air races will also be held at the London Aerodrome.

Cowes, during the yachting week, is to be the scene of seaplane races under the auspices of the R.Ae.C.

Australia's Air Force

RECENTLY we published details of the constitution of the Australian Air Council and Air Board. It is now announced that the Australian Air Force will consist of eight squadrons, with headquarters at Sydney and Melbourne. Each squadron will comprise eighteen machines in war formation, with three flights of six machines each. The Avro will be the standard land machine, and a large number of Avros have been presented by the Imperial Government. The suitability of Australian timbers for aeroplane construction is being tested, and it is hoped to obtain wood sufficiently light to replace spruce and to meet the requirements of the British Air Ministry.

Spad Flies Paris-Strasbourg

ON March 17 the Spad berline 'bus made a first flight between Paris and Strasbourg via Bajac, with 3 passengers and 300 kilogs. luggage, covering the 440 kiloms. in 2 h. 40 m.

An Ansaldo berline, with J. Stoppani as pilot, is shortly making its initial flight between Paris and Turin with six passengers.

An Italian Service

FROM Rome it is reported that a seaplane service is about to be started between Brindisi, Corfu, Crete, Derna and Alexandria. The service will be made by Italian seaplanes, which will carry passengers and mails.

Paris-Prague

THIS week—March 20—is the date given for inaugurating the Strasbourg-Prague section of the Paris-Prague air-route. Through the Franco-Roumanian company it is to be operated by 20 Potez machines, the journey being scheduled for 6 hours. In June it is hoped to open the Prague-Bucharest section, via Vienna, Belgrade and Buda-Pest.

BRITAIN'S FIRST RIGID PASSENGER AIRSHIP

The "R.36" Completed at Inchinnan

ALTHOUGH late in beginning to take an active interest in airship design and construction, this country has, during the last three or four years, made great strides in this branch of aircraft engineering, and it is probably true to say that at the present time we need not fear foreign competition as far as design and skill in construction is concerned. We wish the same could be said with regard to the use of airships. That, however, is another story. Our airship designers have accumulated during the past years a vast fund of data and experience, and if they are kept together and allowed to continue on the very excellent foundation now built up, there does not appear to be any reason why Great Britain should not supply the world with airships, much as she has supplied the world with surface ships. To show, in quite a small way, what can be accomplished in the way of passenger airship services, some of the airships that were originally planned as service airships are being altered to provide accommodation for a number of passengers, and it had been hoped to run some experimental services during the coming spring and summer. It is now, perhaps, somewhat doubtful what will be the fate of these ships, and up to the time of writing there does not appear to be any concrete proposal forthcoming in response to Mr. Churchill's offer of giving the ships free, gratis, and for nothing to any firm who would undertake to run services with them. It is, however, to be hoped that means will be found for putting these splendid airships to practical use, so that the work and money spent upon their design and construction may not be entirely wasted.

In the meantime a few notes dealing with the "R.36," which is just completed at the Inchinnan works of Messrs. William Beardmore and Co., may not be without interest. At the invitation of the Air Ministry and Messrs. Beardmore's, representatives of the Press paid a visit to the works at Inchinnan during last week in order to inspect the "R.36," or as she is known in her commercial capacity, the G-F.A.A.F.

Originally designed as a service airship in 1919, the "R.36" was not sufficiently advanced to preclude the possibility of converting her into a passenger craft when it was decided to abandon the airship programme. This has consequently been done, and in her present shape the G-F.A.A.F. has a most luxuriously equipped passenger accommodation, with room for about 50 passengers. The overall length of the airship is 672 ft. and her diameter is 78 ft. The cubic capacity is 2,101,000 cubic ft., giving a gross lift of 63.8 tons. Out of this about 9½ tons lift is available for passengers

and/or cargo. When used as a passenger airship there is, as already mentioned, accommodation for 50 passengers and their luggage, and in addition she carries petrol and oil for a cruise of over 4,000 miles at a cruising speed of about 50 m.p.h. The maximum speed is estimated at about 65 m.p.h.

The passenger accommodation is in the form of a long cabin attached to the underside of the hull, forming apparently a unit with the hull, but being in reality a separate structure, divided from the hull and from the engine cars. The car is 130 ft. long, with a floor 9 ft. wide and the sides sloping outward and upwards. The angle thus formed is very convenient for mounting the 50 berths, which are so designed as to fold flat against the sides of the cabin when not in use. Out of the 130 ft. length 84 ft. are set aside for the passengers, the remainder being taken up by galleys, lavatories, luggage compartments, etc. At the forward end is the navigation car. The passenger cabin is so entirely separated from the rest of the airship that it has been decided that it will be quite safe to smoke, so long as ordinary care is exercised. This will no doubt prove a great boon to travellers, as it would, to most passengers, be a considerable trial to have to do without a smoke for two or three days.

Along the sides of the cabin are arranged tables, easy chairs, etc., and each passenger has a half-share in the table as well as his own chair. The berths are partitioned off by curtains so that at least as much privacy is provided as on board liners with four or more passengers in each cabin. The galley is, needless to say, provided with electric cooking appliances, and hot meals will be served regularly on the journey.

Large windows are provided along both sides of the car, so that the passengers should be able to obtain a most excellent view of the scenery below. Add to this the fact that the engine cars are a considerable distance away, and that consequently there is very little noise and no draught, and it will be realised that airship travel is probably by far the most comfortable mode of transport yet devised. The cabin is long enough and roomy enough to enable the travellers to promenade and thus obtain exercise. Altogether it would be difficult to imagine a more convenient and charming method of travel than that afforded by such airships as the "R.36," and it is to be hoped that this airship will be the pioneer of a series of airship services between this country and the colonies. It is hoped that, weather permitting, a trial flight will be made on Friday of this week,

NIGHT FLYING

Observation Flight by "R.33."—The successful development of night flying facilities for aircraft is an important factor in the future progress of civil aviation. To assist in this direction experiments have been carried out at the Government Terminal Aerodrome at Croydon and along the route to the Channel coast with various types of aerial lighthouses, searchlights, pyrotechnic lights and obstruction and landing lights. In order that these different forms may be thoroughly tested by observation from the air, it has been arranged that the civil airship G.F.A.A.G. (late H.M. Airship "R.33"), which is now carrying out mooring mast experiments at Pulham Airship Station, will undertake an observational flight along the London-Folkestone route. Owing to the comparative nature of the observations to be made, it is necessary to select a clear night for the tests. As the ship is not housed but moored at the mast between flights, this observational flight can take place at short notice and will be carried out on the first suitable occasion.

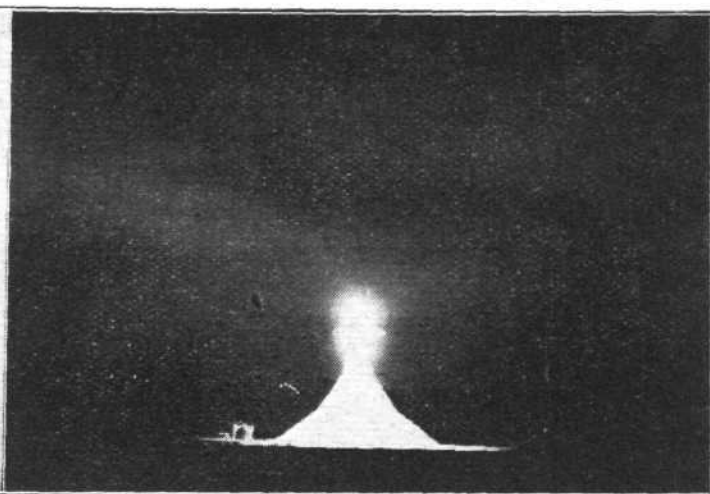
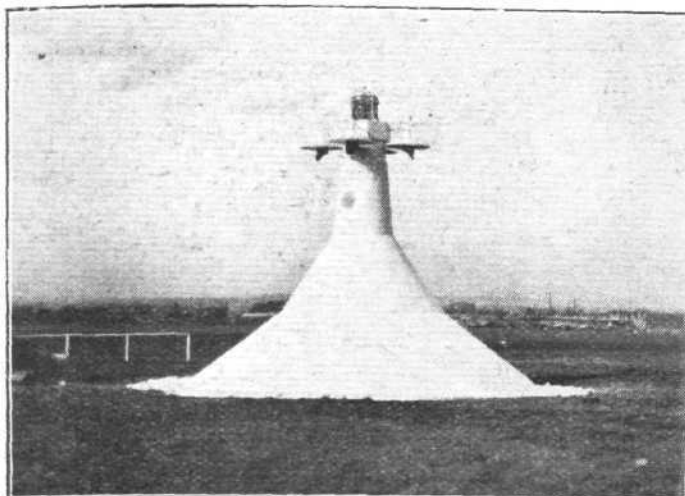
The programme provides that the ship will leave the mast at Pulham Airship Station shortly after dusk, will proceed over London to the neighbourhood of Croydon Aerodrome, and will test the range and efficiency of the aerial lighthouse and searchlights from the point of view of easy location of aerodromes. Observers will also decide on the value of certain pyrotechnic aids to navigation and examine the obstruction lights, and, if they are completed, the illuminated landing "Ls" which are being fitted to provide a semi-automatic indication to aeroplane pilots of the direction and position in which they should land and take off. Observation will also be made of a new "Cone" light which is being experimented with as a local pilotage light at aerodromes. This light is projected downwards on to a white cone and, if found to be satisfactory, will be used as the main location light at civil aerodromes, the

ARRANGEMENTS

aerial lighthouse proper being reserved for marking intermediate points on routes.

From Croydon the airship will proceed along the London Continental route to Lympne where she will survey from the air a spot that has been tentatively selected for an aerial lighthouse. For observation purposes a small war-type lighthouse has been temporarily erected on the spot. The ship will then pass over the coastline and will carry out observations of various types of marine lighthouses and lightvessels, in the Channel and the North Sea, which are visible from the air. During the flight wireless practice for direction-finding purposes will be carried out, and general wireless telegraph and telephone communication will be maintained with land stations. The flight carried out by the "R.33" on the night of March 15 was one of the series of routine flights which take place almost daily in connection with the mooring mast experiments.

During the night between March 17 and 18, the "R.33" had an exciting time trying to get from Pulham in Norfolk, where she is stationed, to Croydon, in order to carry out observations on the lighthouses, etc., at the Waddon aerodrome. Leaving her mooring mast at Pulham at 11 p.m., she proceeded in a south-westerly direction, but made little headway, as she was facing a very strong wind of between 45 and 50 m.p.h. It had been arranged that "R.33" should be over Waddon about 1 a.m., in order to observe the illumination of the white cone recently installed there, but the hours wore on without any news of her. Finally, just before one o'clock the wireless operator at Croydon reported that he could hear the "R.33" speaking by wireless, but could not distinguish her message. No further news of the airship was received until about 2 o'clock, when she gave



THE NEW A.G.A. AERIAL BEACON INSTALLED AT CROYDON: The powerful lights at the apex of the cone are reflected upwards by the whitened surfaces, giving the beacon a very distinctive appearance discernible at considerable distances.

her position as three miles S.W. of Ipswich, saying that she would not be over Waddon until after five. Thus, she had taken three hours to cover a distance of approximately 30 miles, or was doing about 10 miles over the ground! It was not until about 5.35 a.m. that those waiting at Croydon caught sight of the airship. She was then some 15 to 20

miles away, and presently was seen to turn for home, making very good progress with the wind. She reported that she had seen the Cale light from a distance of 19 miles. Arriving home at Pulham about 10 a.m. the "R.33" did not attempt to pick up her mooring mast, but proceeded to carry out navigation tests throughout daylight.

ROYAL AERONAUTICAL SOCIETY NOTICES



Wilbur Wright Lecture.—The annual lecture in memory of the late Wilbur Wright, to be delivered by Maj. G. I. Taylor at the Royal Society of Arts, on April 12, at 8 p.m., will be "Scientific Methods in Aeronautics."

Safety and Economy Committee.—The terms of reference of this Committee, previously announced as an Engine Committee, have been enlarged to cover discussion of the question of the type of engine and machine arrangements, etc., required for the safe and economical working of an aeroplane carrying mail and passengers (a) between London and Paris, and (b) over a 500-mile route. Wing-Comdr. Landon and Col. Bristow have been co-opted as members, and at their first two meetings the Committee have agreed upon a number of desiderata.

State Subsidies.—Following upon the Conference held at the Air Ministry, a memorandum has been forwarded to the

Under-Secretary of State for Air, calling attention to the necessity of bearing in mind the needs of designers and the construction side of the Industry, in order to insure development in design.

Bronze Medal.—At the last Council Meeting it was decided to revive the award of the Society's Bronze Medal, which has been in abeyance since the outbreak of war, and to devote it to the encouragement of the preparation of original papers by Students. Details will be announced later.

Election of Members.—The following Members were elected in the various grades as shown at the Council Meeting held on March 15:—

Associate Fellow: Capt. L. C. Bygrave, A.M.I.E.E.
Students: P. W. Dorn, H. Fraser, G. R. Irvine, T. C. Sharwood.
Member: Maj. J. Gumbleton Currie. **Associate Member:** Capt. T. Oyama, I.J.M. **Foreign Member:** W. F. Eade.

W. LOCKWOOD MARSH

Secretary



Married.

Maj. H. GRAEME ANDERSON, M.D., F.R.C.S., R.A.F., of 75, Harley Street, W., was married on March 18, at St. Columba's (Church of Scotland), Pont Street, S.W., to GLADYS, elder daughter of CHARLES HOOD, of Hatch End, Middlesex.

Flight-Lieut. PATRICK HUSKINSON, M.C., R.A.F., only son of Col. and Mrs. Charles Huskinson, of Wath, Pateley Bridge, Yorkshire, formerly of Farndon, Notts, was married on March 10, at St. Andrew's, Ashley Place, to ADA MARY, only daughter of the late Major and Mrs. DENNEHY.

JOHN RANDALL POTTER (late Major, R.A.F.), elder son of Canon and Mrs. J. Hasloch Potter, of Surbiton, was married on March 3, at St. Mark's, Surbiton, to JESSICA WILSON THOMAS, widow of Owen R. Thomas, only daughter of Mr. and Mrs. Wilson Cruttwell, also of Surbiton.

To be Married

The marriage arranged between Capt. FRANK F. DUTTON, M.C., D.F.C., late R.A.F., only son of G. W. Dutton, Esq.,

J.P., and Mrs. Dutton, of Hartford, Northwich, and GLADYS MARGARET, daughter of J. W. DEAKIN, Esq., J.P., and Mrs. DEAKIN, also of Hartford, Northwich, will take place on April 2, at St. John's Church, Hartford, at 1.30 p.m.

An engagement is announced between Lieut.-Col. LAURENCE H. STRAIN, K.C., D.S.C., R.A.F., of 45, Heriot Row, Edinburgh, and ELLEN MARGARET, only daughter of the late A. H. HOWARD and Mrs. HOWARD, and niece of Mr. and Mrs. Henry Edmunds, of Moulsecombe Place, Brighton, where the marriage will take place.

An engagement is announced between MARY, the only daughter of Lieut.-Col. HERBERT D. WILSON, D.S.O., T.D., and Mrs. WILSON, of Whinthwaite, Levens, Westmorland, and Lieut. NEVILLE JONES, M.C. (late R.A.F.), eldest son of Richard Jones, of The Hermitage, Great Saughall, Cheshire.

Item

MR. JOHN LAWRENCE HALL, so well-known Hendon way, whose death occurred in London on Christmas Day, left £6,438.

AIRISMS FROM THE FOUR WINDS

WHEN we saw in the evening papers last week that sensational heading, "Twelve Battleships Stolen," we just wondered. Then it struck us that here was an opportunity for Sir Percy Scott to get his famous question, "What is the use of a battleship?" answered. As a thief seldom annexes articles without previously knowing what use he has for them, surely the culprit in this case would be able to enlighten Sir Percy as to his scheme, and thus lay out that middy flat who says they're no damn good at all. And then came light. They were only *model* battleships after all! So Sir Percy will still have to continue his insistent cry.

We only hope that he *will* succeed in his endeavours to bring home to the public what aircraft really mean to the Empire. Our responsible Government officials can hardly plead presently want of knowledge as an excuse for crashing the country badly, in the event of our being outclassed in the air by countries whose appreciation is a little more alive than with our own crowd. Sir Percy, writing the other day upon the "striking lesson" to be learned "from our own plans and preparations," stated: "It is no secret now—every man in the Services knows it—that had the War lasted another fortnight we would probably, by means of an aerial attack, have sunk all the German ships in the Kiel Canal."

Or could it be pleaded that although known to "every man in the Services" the top-dogs had no knowledge of such trivial matters?

As a real effort by the lay Press to help along aviation and disseminate popular information thereupon, the following report in the *Evening Standard* will take some beating:—

AIRCRAFT ON THE THAMES.—Further alighting tests of aircraft are taking place on the Thames this afternoon in the stretch of water between Westminster and Albert Bridges. The tests are being organised by the Air Ministry and the Air Ministry's Amphibian, the Vickers' Viking and the Napier Lion will be used.

THE latest air post stamps come from the Central American Republic of Honduras, where, in connection with an aerial mail service, certain of the current postage stamps are to be overprinted "Correos Aëros."

MR. LLOYD GEORGE, in his ultimatum to Dr. Simons and the German delegates at St. James's Palace, on March 3, said:—

"Take the case of the French flax industry, a most important industry in France. This was practically wiped out during the War by the process of destroying all the machinery, so that Germany, which supplied France before the War to the extent of 8.5 per cent., now supplies 50 per cent. of the flax products."

A correspondent, commenting upon this, points out that "It must be remembered that flax is essential for the manufacture of aeroplane fabric. The stronger hold Germany gets on the flax market the more she will endeavour to hinder the development of aviation in other countries."

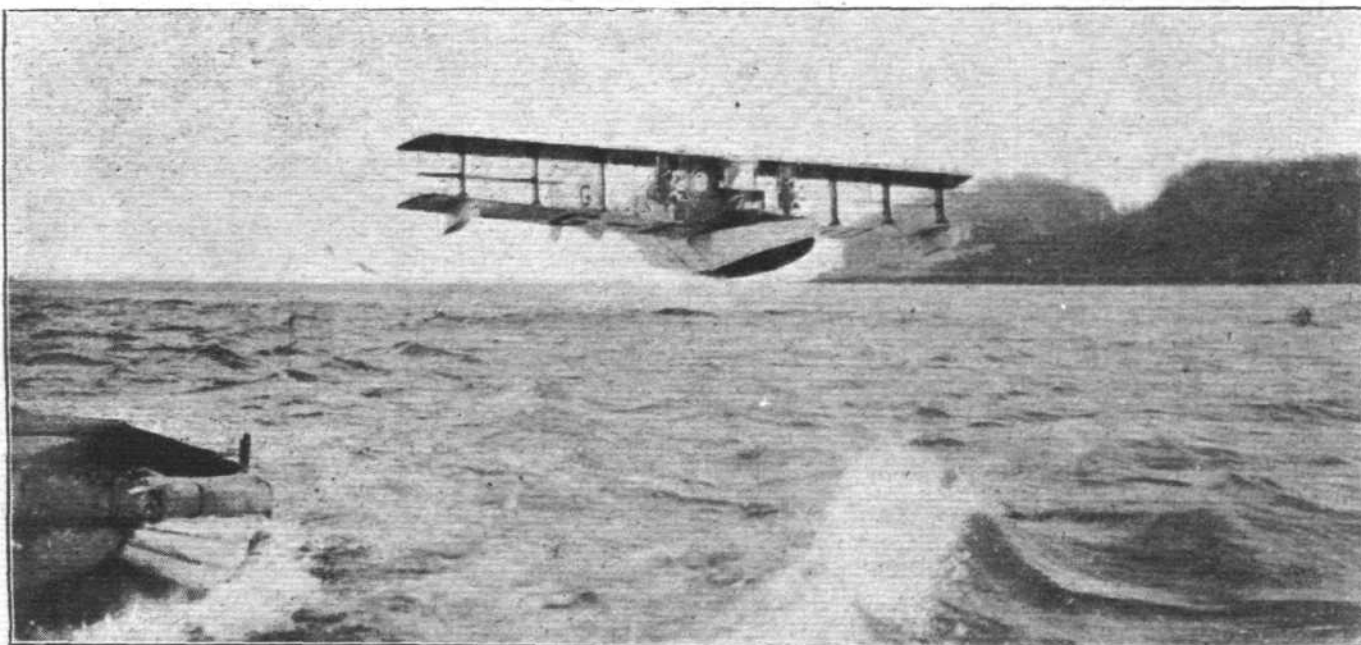
"What is happening with regard to this country? Potash is a vitally important fertiliser for flax, and if we are to develop flying we must greatly increase our flax area and must develop to the utmost our own potash industry, which is as yet only in its early stages. The German is determined to kill our industry and regain his pre-War ascendancy in potash. He is benefiting by the low value of the German mark to flood this country with potash products at less than pre-War cost so as to smother our own industry and get us firmly under his thumb."

"We can produce potash for our flax areas in this country if we safeguard our own industry, and we can back up our own resources by bringing in potash free of duty from our ally France."

Which is a point well worth providing for.

THE latest suggestion for an aeroplane stunt is assuredly original. It is to exterminate the mosquito. This idea, it is stated, is being planned, according to the *Pall Mall Gazette*, "by the provincial government. An aerial survey of the Fraser River delta, as the first step in a scheme to curb the annual swarms of mosquitoes, has been ordered."

ENTERPRISE is indeed advancing if the announcement is correct that an Iceland flying company proposes this summer to establish an Iceland-Denmark aeroplane service from Reykjavik, Iceland, to Leith, Scotland (about 850 miles), and from Leith to Copenhagen (about 570 miles).



TESTING THE SAUNDERS "KITTIWAKE": Mr. F. Warren Merriam getting off in good style at Cowes. During the past few weeks Mr. Merriam has been putting this machine through her paces and is now convinced that she is quite O.K. The variable camber gear has been found to work very well, and with the wings cambered the machine gets off very quickly indeed, in spite of her somewhat heavy power loading. A full description of the "Kittiwake" appeared in our issue of September 9, 1920.

FLYING BOAT CONSTRUCTION*

By DAVID NICOLSON, A.M.I.N.A., A.F.R.Ae.S.

THE design and construction of light hulls and floats suitable for flying boats and seaplanes is a very highly specialised branch of shipbuilding. This being the case, all matters pertaining to same should be in the hands of naval architects. At a recent lecture before this Society, Commander Hunsaker, of the United States Navy, stated that British aircraft designers followed the naval architect's methods more than in any other country; he thought this was natural as he gave us the credit of being the first maritime power of the world. This may be perfectly true with regard to airships, but I cannot endorse his opinion that the majority of flying boats built in this country show the impress of the trained hand of a naval architect. I do not imply that the American boats are superior to ours, as for instance, a large American boat with twin engines built in the United States, which we used for the North Sea patrol, was by no means typical of good boat-building; there were no less than four consecutive planks butted—not even scarfed—on the same timber, which had a siding of $\frac{1}{8}$ in., the line of butts being in line with the step where the boat was naturally weakest.

The Curtis boat, as originally built, was wall-sided, i.e., without projecting side fins to the front step and planing bottom, but as it experienced difficulty in getting off the water, the breadth of the step was increased by adding fins, thereby improving the planing efficiency, although the fins in service were very liable to damage.

American-built boats were later on imported in considerable numbers, but although the workmanship and materials were much improved, they were still weak owing to lack of continuity in the structural design, and frequent damages were reported, until at length the whole bottom had to be stiffened by timbers and stringers.

Boats of the "F" type which followed were a great improvement on the original type, but as in the previous boats, the bottoms gave trouble owing to the faulty keel and bottom construction.

For the past two years many builders have been debating about the construction of flying boats. On the one side it has been contended that flying boats should be built as light as possible, and that there should be no restriction whatever placed upon the designer in the matter of the construction. In support of this it was said that the designer must of necessity build his hull strong enough, otherwise she would lose her shape. It would also be very unwise to tie a clever designer's hand with a more or less hard and fast table of scantlings. The arguments on the other hand were of a purely practical nature. It was maintained that the keenness of competition was such that, if lightness of construction were unlimited, most flying boats would be weak, and probably unseaworthy. The same vexed question of scantlings was much discussed a few years ago by yacht-builders as to whether racing yachts should be classified by Lloyd's and built under their rules. Arguments on similar lines to the above were put forward by the two schools of thought, and after the International Conference of 1906, the yachtsmen of Europe decided to abandon all theoretical contentions, and they passed a rule that every yacht racing under the rules of the International Yacht Racing Union must be classed either by Lloyd's Register of Shipping or other corporation. And now, in my opinion, similar rules should be drawn up for the construction of flying boat hulls. In coming to this conclusion, it must not be supposed that designers would place themselves unreservedly in the hands of the classification committee, as in the case of yacht-building hard and fast jurisdiction or monopoly of surveying the building can be guarded against. Every racing yacht must be built according to the rules and scantling tables, but the choice of material is left to the owner or builders, provided it will pass the inspectors. Again, provided the yacht obtains the class "R," the owner is not obliged to obtain the class for her for any special term of years. Thus one yacht may be classed "10 R," another "12 R," and another "14 years R," and all would be equally eligible under the Y.R.A. rules. Regulations similar to the foregoing could also apply to boats built for civil aviation but with a much shorter period.

In some cases floats were built and passed for civil aviation, and when similar floats were required for the services they had all to be strengthened, many extra fastenings put in the butt joints, heavy butt straps fitted, and special diagonal stiffeners put on the bulkheads. If the floats required all the extra strengthening for the services, surely for civil work,

when probably more lives were depending on these floats, they should have been made to the same specification; or if they had been passed, a certificate for only a few months should have been given. Again, the gusset pieces of three-ply were only glued and tacked to the frames, and when the services required the floats they had all to be through fastened and the edges protected, and if this had been carried out on the civil aircraft, a class for, say, two years, could then have been granted. Extra periods of classification should be granted according to the fastenings and materials used. In granting certificates for airworthiness in civil aircraft, the technical department might include seaworthiness for all flying boats and also classify them yacht fashion and give a period when the boat should again be surveyed.

If a boat is built to rules, the class is determined by the scantlings and equipment, and is adopted for the purpose of insurance in some cases. In building to a class, the scantlings of all the structural parts are fixed by the table of rules, thus ensuring uniformity of weight of structure. If we consider the case of the "F" type of boat, it will be seen that there is no uniformity of weight of structure, the nose is much too heavy, the stringers too closely spaced, while the timbers and bottom are much under strength. If we are to carry passengers in flying boats, then their safety if they have to alight at sea must be considered.

Since longitudinal damage is most destructive as regards loss of buoyancy, the criterion of risk should be measured longitudinally and under water. Therefore some regulations should be drawn up by means of criterion of risk which involves a longitudinal under-water tear extending for a constant percentage of the length of the boat.

All interested in the design and construction are seriously concerned with the present unsatisfactory position of the watertight sub-divisions and bulkheads. At a paper read by the late Major Linton-Hope before this Society, much discussion took place on this very important subject, and yet up to the present no action has been taken to remedy same. The principal difficulty is to fit a bulkhead that will stand the inrush of water, and yet be resilient to pant if the hull is resilient. In my opinion this can be got over by adopting lap or expansion joints instead of edge to edge or tub joints as is now practised.

Bulkheads are useful in three ways—as W.T. divisions, as fire screens, and as structural diaphragms. In the first capacity they may confer immunity from sinking, for should water enter the boat as a result of damage to the skin, it may be confined to the one space; in the second they may, should a fire occur, confine the conflagration to the one space, facilitate its extinction and limit the damage. In the foregoing two capabilities, their usefulness is only potential, but in the third, as structural diaphragms, they are at all times beneficial, for by uniting the bottom, sides and deck, they are most efficient in checking any tendency to alteration in the form of the transverse sections, due to racking or panting stresses. Although bulkheads give immunity from foundering, their capabilities in this respect are dependent on many circumstances. The sub-division of the hull must be such that if any compartment be flooded, the loss of reserve buoyancy will not cause the boat to sink. Also if the bulkhead be weakly constructed, it might collapse under the water pressure or it may not be thoroughly watertight. Again, the bulkhead must be built above L.W.L., for if not, as the water rose in the bilged compartment and the boat subsided, it would flow over and fill the adjacent holds. In the past flying boats these qualities do not seem to have been taken note of, and as far as I can see, the bulkheads only acted as structural diaphragms, and very poor specimens at that. Another point worthy of note would be the making of the centre keelson watertight, thus forming a sub-division right fore and aft.

I have not mentioned the alteration in trim due to the flooding of any compartment, as with the present small flying boats, this does not affect us very seriously, but when larger boats are built, this will have to be noted, as it will regulate the position of bulkheads or the size of the various holds.

The subject of bulkheads covers such a large field, especially when fire-resisting material and construction are desirable, that it is not possible here to deal with it to any great extent. The same subject was for many years attracting the attention of shipbuilders, with the result that a special committee was appointed to draw up rules and methods of construction to secure the benefit of safety. It is my opinion that if

* Paper read before the Royal Aeronautical Society on March 17, 1921.

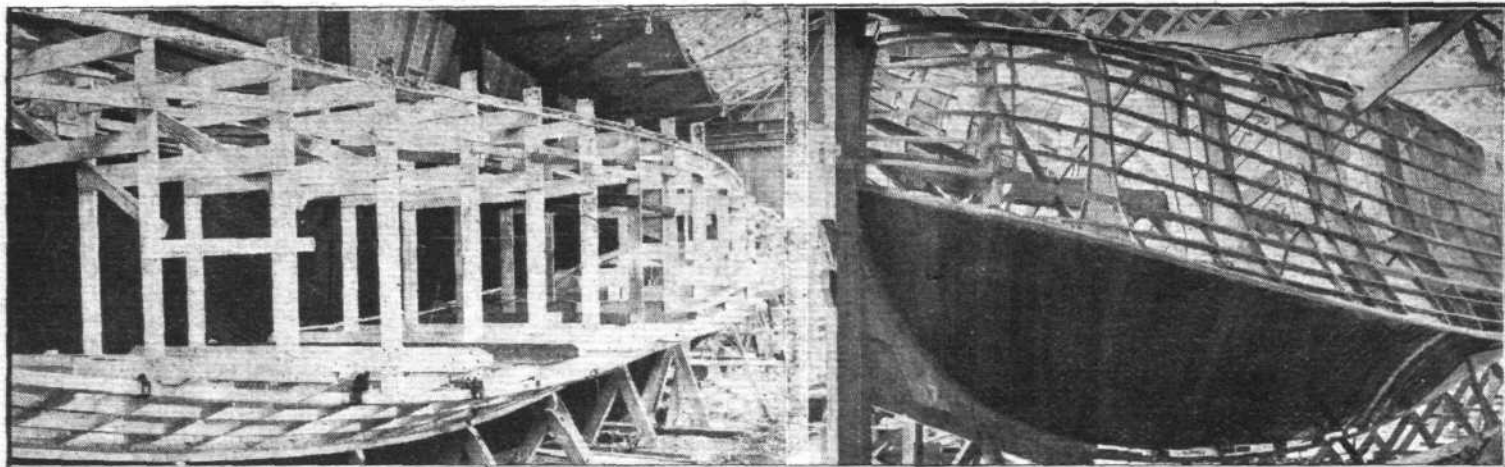


Photo. No. 1.—F boat, showing wrong method of holding moulds together.

Photo. No. 2.—N4, showing web frames and longitudinals.

such a committee was considered necessary for ships, a similar committee of naval architects should be appointed to deal with flying boat bulkheads.

Before touching upon the detail of construction, I think a few words on the "laying off" would not be out of place here. To illustrate the importance of the loft work, I should like to point out that it was owing to the bad laying off that many flying boats at the sea stations required individual trolleys for themselves which had to be specially shaped at the station to take one particular boat. If all these boats had been laid off by a naval architect who appreciates the fineness of the scribe board lines, then the correct offsets supplied to each builder who would not have required to do any fairing in or out, and if the moulds had been properly held by ribands, all the boats would have been very close in shape. I am aware that many engineers and aircraft builders do not realise to what fine limits naval architects have to work when scribing out the lines. I have often heard it stated that anything from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in or out did not matter, hence the reason for so many unfair boats. If a yacht-builder worked to these lines, I am afraid many of his racing yachts would be outclassed if she drew $\frac{1}{4}$ in. more than her designed draft; and soon the builder would have to construct flying boats for the agents who consider that such fine lines are not necessary.

Aircraft manufacturers who have not had any experience in power boat building will find it essential to lay a mould loft floor if they intend building flying boat hulls, and when the floor is properly laid and painted, fair lines will be much more easily scribed. In the first place, the sheer plan must be delineated on the floor, then the half breadth, and finally the body plan. When these have been scribed and the thickness of plank removed, then the moulds for frames can be lifted direct, also the various moulds showing the shape of different parts of the hull, battens and templates giving precise information as to the sizes and disposition of the structural parts can then be lifted. These lines are very useful as they often dispense with the necessity of fitting a mock-up in the shops. When the moulds are made, the stocks have to be set to take same, and here many of the builders of flying boats placed these about one foot above

the floor to find that when the boat was ready for riveting they had to lift the whole hull and raise the stocks to a convenient height to allow the men to work under. The moulds now set in place on the stocks have to be kept in position by ribands, each riband running the whole length of the boat; here again many builders erred by fastening each pair of moulds together by small battens, as will be seen in photograph No. 1, and then they wondered why the boat was not fair when she was planked up. A good example of this was seen in the F. 5 boats, where many metal fittings were made to a jig by one firm to obtain good production, but this object was defeated as many of the fittings did not coincide with their structural part, therefore the various builders had then to make their own fittings to suit their particular lines.

The principal feature in many hulls is the skin; all the other structural parts are more or less subsidiary, their function being to support and stiffen it. The skin is stiffened by framework disposed transversely and longitudinally, and further the sides are united by beams to support same against collapse. The same total strengthening can be effected by heavy frames spaced at wide intervals or by numerous small frames spaced very closely, but these systems cannot, for practical reasons, be exceeded, as in the former, if the frames were widely spaced and proportionately heavy, they might preserve the form of the hull as a whole, but they would not give sufficient local stiffness to the skin in order that it would not buckle between the frames. If the latter was carried to excess the ultimate result would be equivalent to a mere thickening of the skin. If made sufficiently thick it would be self-supporting, but owing to the excessive thickness it would be too heavy and useless for flying boats.

Before setting the scantlings of a hull, the most efficient disposition of material should be considered in conjunction with the duties the boat has to perform. The cost of construction should also be taken into account, and this is dependent to a certain extent on the quantity of material used and on the method of construction. If the hull is built of few and heavy parts, it would involve less skilled labour, therefore would be much cheaper, but the hull built of more numerous parts, smaller, but efficiently formed, and disposed

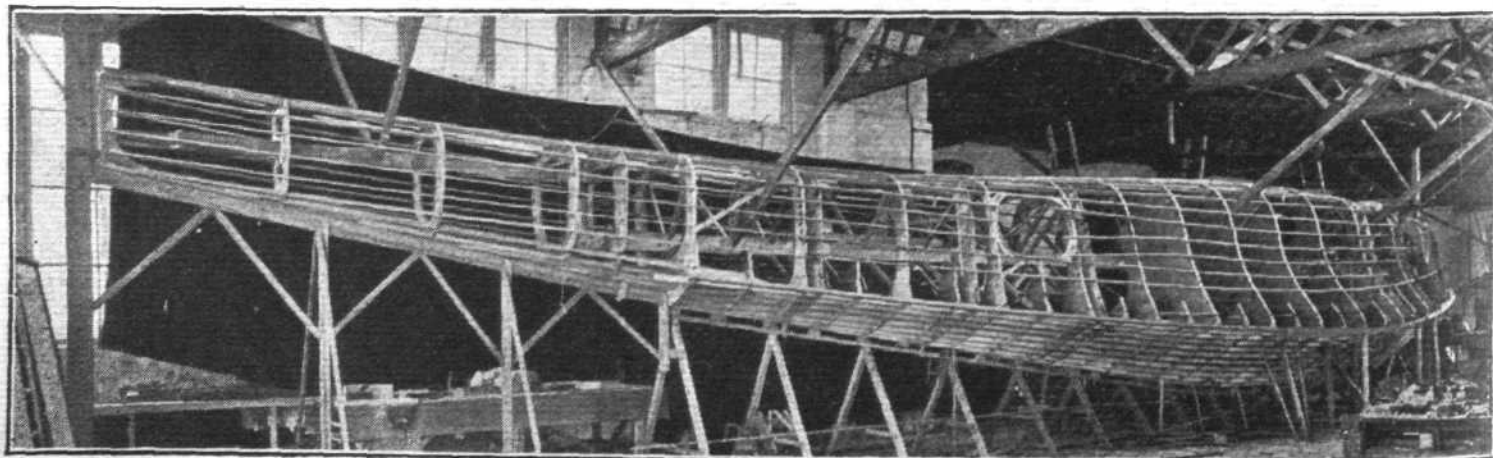


Photo. No. 3.—N4 Atalanta. Skeleton view showing longitudinal system.

of for their more specialised duties, although the initial cost is more, is the better boat, as it will be lighter, and as carrying capabilities are so important, the extra first cost is justified.

In the usual type of hull the transverse frames form continuous ribs round the body, giving to the yielding skin the necessary lateral stiffness, and resist all stresses tending to alter the form of the transverse sections; however, this would give imperfect rigidity, as each one would be independent of the adjoining one, therefore, to give a combined and good resistance, they are united by the keelsons and side stringers. The boat's framework is thus composed of the transverses and longitudinals. The former, disposed in direct contact with the skin, constitute the main skeleton of the hull, the skin and other members being fitted to it as a groundwork. The keelsons and side stringers are fitted in continuous lengths within the transverse which form a supplementary skeleton; these are connected, not merely to the inner surface of the transverse frames, but extend intercostally between them so as to connect to the skin. The lower part of the transverse frames are made specially strong by having the floors connected to same, as the bottom is liable to severe pressures, both widespread and local, through the hull being docked in trolleys or resting on the keel. For a similar reason the keelsons are made stronger than the side stringers; they also prevent the hull from hogging and sagging. The centre keelson being strongest of all, it might be regarded as the backbone of the hull.

It will be well to notice the difference and relative value of the two qualities, strength and stiffness, or rigidity. If we now consider the efficiency of the frames *versus* the stringers in stiffening the skin and supporting the sides against deforming forces, the transverse frames are short compared with the stringers, as they only go from the keel to the deck, whereas the stringers run the whole length of the boat. It will be seen that the stringers, on account of their great length and consequent elasticity, cannot by themselves give useful resistance to widespread straining forces. Their principal duty is to give local support through their binding effect on the transverse frames, and, when fitted intercostally, to stiffen the skin.

I think we might now consider the longitudinal *versus* transverse system of framing, or it might be stated which of the two kinds of stresses, longitudinal or transverse, should govern the boat's structural design. In the longitudinal system the main fore and afters run all the way of the boat, the web frames being cut out to allow them to pass. The web frames extend round the body of the boat, usually at fairly wide intervals, and are of such depth and massiveness that they form strong and almost inflexible supports to the sides, deck and bottom against all transverse forces. The supporting framework of the deck is arranged like that of the sides, light longitudinals being carried continuously through the deep cross girders. It may be said that in the foregoing system the deep web frames form the main skeleton of the hull, giving it all the necessary transverse

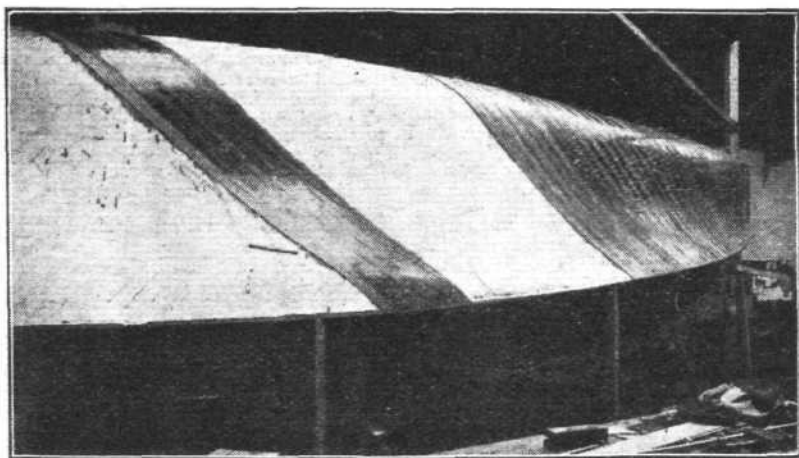


Photo. No. 4.—N4 Atalanta. View from amidships, looking forward.

strength to maintain unyieldingly its transverse shape. The longitudinals may be regarded as forming stiffening material for the skin and deck, giving these flexible surfaces the necessary rigidity to withstand all bending pressures acting between the supporting transverses (see Photo. No. 2).

In comparing the longitudinal with the transverse arrangement of the light subsidiary frames, it will be seen that the heavy side stringers have been dispensed with; it also possesses the advantage of stiffening the skin against the buckling tendencies brought about by the fore and aft compression stresses which accompany hogging and sagging of the hull. Transverse frames and beams cannot prevent transverse buckling tendencies of the skin between them; to counteract this, they must be placed closely together or the skin increased in thickness. As the compressive stresses above mentioned are most acute at the top of the hull, it is evident that a longitudinal arrangement of beams is even more important than a longitudinal arrangement of side frames.

The longitudinal system is not only advantageous in increasing the longitudinal strength of the hull, but it also means a considerable reduction in weight which, while permitting additional carrying weight, also reduces the first cost. One of the disadvantages of this system is that the numerous deep projections cause the interior space of hull to be broken. A good example of the foregoing mentioned longitudinal system is the N.4 Atalanta designed by Mr. Charles E. Nicholson. His method omits the closely spaced transverse frames and beams; the transverse strength is obtained by fitting directly on the skin a series of strong web frames at widely-spaced intervals. The longitudinals take the place of ribbands, and only require to be secured to the transverses carefully and very little fairing is required (see Photo. No. 3). Photo. No. 4 shows diagonal planking of the N.4 Atalanta built on the longitudinal system.

(To be Continued.)



No. 9 Squadron R.N.A.S. Dinner

THE First Annual Re-union Dinner for members of the late No. 9 Squadron R.N.A.S. and 209 Squadron R.A.F., was held at the Dean Hotel, 87, Oxford Street, on March 5, Flt.-Lieut. T. F. N. Gerrard, D.S.C. (who was one of the Squadron-Commanders during the War), presiding. Ten former officers and thirty-seven old comrades were present.

The company sat down to an excellent menu, which was appreciated in the good old English style, after which the Chairman, in proposing the toast, "To the Squadron," brought back to the memory of those present incidents, grave and gay, which occurred whilst serving their king and country overseas. The Secretary reported briefly on the work of the Committee, which was formed to inaugurate the function, and expressed the desire that there should be an annual Re-union, which was reciprocated by all present.

An excellent musical programme was rendered under the direction of Mr. H. Ball, after which a very enjoyable and merry evening was brought to a close by the singing of the National Anthem and Auld Lang Syne.

Copies of the photos, taken during the evening may be obtained upon application to the Hon. Secretary, Mr. A. H. Middlemiss, 74, Devonshire Road, Hackney, E. 9, who will be glad to hear from any who served with this Squadron, or who are still in the Service, who for various reasons were unable to be present at the first re-union.

It is desired to get into touch with all old comrades, so that any item of interest may be forwarded to them, and also due notice of future re-unions.

It is proposed to hold the next re-union dinner on the last Saturday in March, 1922.

Cattewater Re-union Dinner

THE Cattewater (R.A.F. Seaplane Base) Old Boys' Club are holding their second Re-union Dinner on April 2 (Saturday), at 6.30 p.m., at the Midland Grand Hotel, St. Pancras. Tickets can be obtained of the Hon. Secretary, Mr. H. F. Boshier, 158, High Road, East Finchley, London, N. 2.

46th Squadron Annual Dinner

THIS squadron is holding its annual dinner at Simpsons, in the Strand, on Saturday, April 2, at 6.45 p.m. Tickets £1 each, and members are invited to bring one guest, provided he is paid for by the member so bringing him. All desirous of participating should communicate with Captain C. J. Marchant, 51, St. Kilda's Road, Stoke Newington, N. 16.

Swift Reprisals

IN Mesopotamia two bands from Turkish territory recently made a raid in the Mosul area, and one of them collected booty to the amount of 70 camels and 1,300 sheep. Our aeroplanes were swift in retaliating by bombing the raiders' camps on March 3 with good effect. Two of our machines were hit by fire from the ground.

IN PARLIAMENT

Enemy Air Raids (Compensation)

COL. NEWMAN on March 8, asked the Prime Minister whether he is aware that, beyond a compassionate grant, no provision has been made for the wives and dependants of civilians killed in enemy air raids during the War; whether he will consider the desirability of giving such wives and dependants a first claim on any indemnity received from Germany; and if he will say to what Government Department representations as to those who are now in want because of the death of the bread-winner killed by enemy aircraft should be addressed and their needs met until an indemnity is forthcoming?

Mr. Chamberlain: In reply to the first and third parts of the question, the wives and dependants of civilians killed in enemy air raids during the War received grants from public funds following generally the principles of the Workmen's Compensation Acts in pursuance of the undertaking given by my predecessor on June 28, 1917. Any such dependant who has not received a grant and wishes to apply for one should write to the Ministry of Health. In reply to the second part of the question, I would refer the hon. Member to the reply which I gave to a question by the hon. Member for the Ladywood Division of Birmingham (Mr. N. Chamberlain) on May 4 last.

Aviation

SIR W. JOYNSON-HICKS on March 8, asked the Secretary of State for Air whether the Committee has yet been appointed to consider the help to be given to civil aviation; and whether he will see if enough can be saved by economies in the Civil Aviation Vote to provide reasonable subsidies to companies willing to restart air services?

Capt. Guest: As announced in the Press, a Committee has been appointed, and has already held several meetings with leading representatives of the aircraft transport and construction companies. With regard to the second part of the question, the possibilities which my hon. friend suggests will not be overlooked.

Sir W. Joynson-Hicks asked the Secretary of State for Air whether the full assent of the Admiralty was obtained before it was decided to do away with airships; and whether the needs of a future war have been considered?

Capt. Guest: The decision was arrived at after full consultation between the two Departments, and after the probable needs of the future, as well as those of the present, had been taken into account. I should, however, like to make it clear that the Admiralty, as well as the Air Council, only came to this conclusion with much reluctance in consequence of the paramount need for economy.

Royal Air Force

SIR W. JOYNSON-HICKS asked the Secretary of State for Air what arrangements have been made for the future of the officers now engaged in airship work?

Capt. Guest: These officers will be absorbed in the organisation of the Royal Air Force according to their qualifications and abilities.

Civil Aviation Subsidies

SIR W. JOYNSON-HICKS, on March 14, asked the Secretary of State for Air whether, seeing that unless civil aviation subsidies are arranged within the next fortnight it will be almost impossible to start the necessary air services in time for summer flying, he will carry out these arrangements immediately?

Captain Guest: The Committee appointed to consider the question of civil aviation subsidies has been sitting almost daily. There will be no avoidable delay in coming to a decision on the subject, as the need for rapid action is fully appreciated. Certain tentative recommendations have been submitted by cable to the Secretary of State for Air, but the main difficulty appears to be the want of public financial support.

Sir W. Joynson-Hicks: Can the House be assured that a decision will be reached and carried out, notwithstanding the fact that the seals of the Air Ministry are wandering about somewhere in the East?

Capt. Guest: That is so. That will not in any way interfere with a decision being reached, but the main difficulty in this matter must not be forgotten.

Mr. Raper: Is it not a fact that, owing to the lack of practical support given to commercial aviation, all the Continental mail services are already in the hands of Continental firms?

Capt. Guest: That does not arise out of this particular question.

Airships

SIR W. JOYNSON-HICKS asked the Secretary of State for Air whether he can give the House any Memorandum by the Lords of the Admiralty as to the use of airships during the late War, and as to their willingness to do without them in a future war?

Capt. Guest: The views of the Admiralty on this subject were precisely referred to by the Secretary of State for Air in his speech on March 2, in which he stated that the general policy had been decided upon in consultation with that Department. The correspondence is in an inter-departmental form and was circulated to the Cabinet.

Sir W. Joynson-Hicks: Does that mean that we cannot have any memorandum from the Admiralty on the subject?

Capt. Guest: In this case the words "in consultation with" really are synonymous with consent. In the question of correspondence I must ask the permission of the Admiralty.

Sir W. Joynson-Hicks: I hope my right hon. friend will get that permission. I beg to give notice that I shall raise the question on the Consolidated Fund Bill.



Martinsyde, Ltd.

A MEETING of the creditors of Martinsyde, Ltd., was held on March 15, at Winchester House, E.C., to approve a scheme of arrangement.

Mr. C. T. Barlow, managing director of Accles and Pollock, Ltd., of Oldbury, Birmingham, presided. The liabilities of the company are set out at £227,829 and assets £354,660. The scheme of arrangement provides for the issue to all unsecured creditors of over £10 of debenture stock of a nominal value equal to the full amount of their respective debts in full satisfaction of their respective claims, such debenture stock to carry 8 per cent. per annum interest and to be redeemable by eight equal half-yearly instalments, the first of which is to be payable on December 31 next.

The Chairman said so far as he could see the present position of the company had been brought about by the very fact that they had been successful in making profits, which profits had been invested in plant, buildings, and to a huge extent stock.

After discussion the scheme was approved.

SIDE-WIND

It is not generally known in engineering circles that Messrs. C. A. Vandervell and Co., Ltd., the well-known electrical engineers of Acton, are in a position to supply jigs, tools and quality for all branches of engineering, their factory at Brighton being one of the best equipped in the country for this class of work. Enquiries should be addressed to the company at Acton.

PUBLICATIONS RECEIVED

The Licensing of Civil Aerial Navigators. London: H.M. Stationery Office. Price 3d. net.

Report No. 98. Design of Wind Tunnels and Wind Tunnel Propellers, II. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 107. A High-Speed Engine Pressure Indicator of the Balanced Diaphragm Type. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 109. Experimental Research on Air Propellers, IV. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 28. Loads and Calculations of Army Airplanes. By Ing. Stelmachowski. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1917

Published March 24, 1921

14,825. CLERGET, BLIN ET CIE. Valve-gear for rotary I.C. engines. (159,227.)

APPLIED FOR IN 1919

Published March 24, 1921

28,587. R. P. PESCARA. Screw propellers. (159,266.)
28,720. R. P. PESCARA. Screw propellers. (159,275.)
28,746. SPERRY GYROSCOPE CO. Gyroscopic navigational apparatus. (135,500.)
28,869. C. GRAY and M. BOYAJIAN. Aeroplanes. (159,286.)
29,209. R. P. PESCARA. Flying-machines. (159,309.)
29,232. T. E. MOORHOUSE. Cameras for aerial photography. (159,310.)
30,666. BOULTON AND PAUL, LTD., and J. D. NORTH. Metal bulkheads for aircraft fuselages. (159,351.)
31,432. L. A. and W. KELSEY. Rotary I.C. engines. (159,372.)
31,964. H. HOLLINGDRAKE. In motion recorders. (159,381.)

APPLIED FOR IN 1920

Published March 24, 1921

10,388. T. C. FOWLER. Wire-strainer. (159,430.)

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